ENGINEERING AND MINING JOURNAL

OCTOBER, 1943

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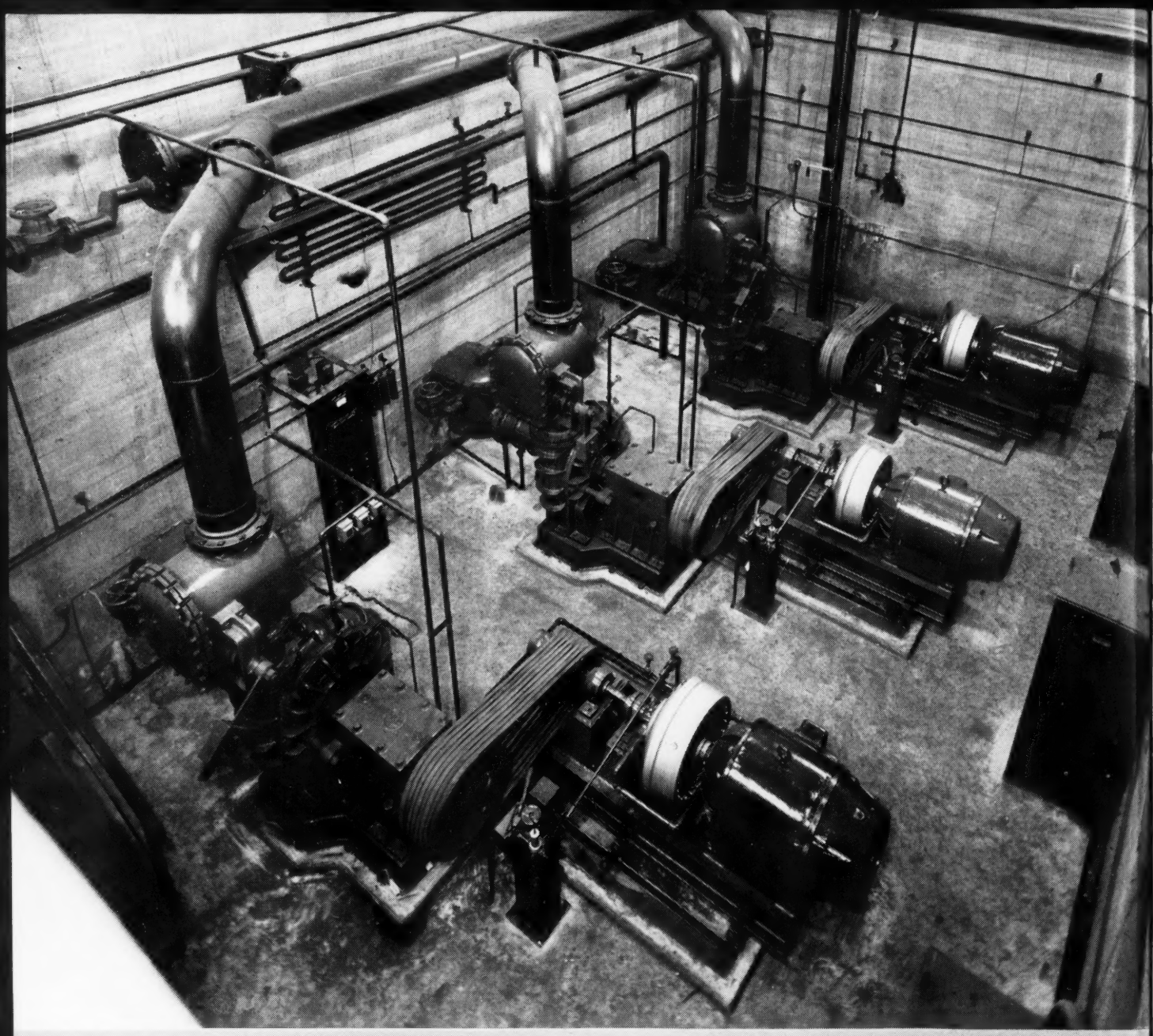
In this issue A New Type Chromite Concentrator
THE WHY AND HOW OF BASIC MAGNESIUM
Treasury Tunnel • An Automatic Montejus
The Basis for Good Labor Relations
Outlook for Iron From Brazil
Complete Contents on Page 57



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E. & M. J. Index, 1943. On account of the paper shortage it will be necessary to restrict the distribution of the index to the current volume of *E.&M.J.* to those subscribers who make a direct request for it. Ordinarily the annual index is bound in the December number, but that is not feasible this year under WPB curtailment of use of paper. Nevertheless, we want to send an index to every subscriber who needs one. If you are one of those, please send your name and address to the Editor immediately, so that an adequate quantity can be printed.

▼

One Hundred Years of creditable achievement in the mining industry were completed in 1943 by Eagle-Picher Lead Co. and its subsidiaries. Not so much because of that record, but because we believe Eagle-Picher's operations in the Tri-State area and in Mexico can furnish a story of unusual interest for our readers, we will devote the November issue of *Engineering and Mining Journal* to an account of these activities of Eagle-Picher Mining & Smelting Co.

This coming issue, the 16th Annual Feature Enterprise Edition of *E.&M.J.*, will contain articles written by various officials of Eagle-Picher covering the company's history, the Tri-State geology, the company's mining, milling, and smelting activities in the Tri-State area, and the Eagle-Picher Mexican operations. Special reference will be made to new operating methods used by the company.

Eagle-Picher's record of mechanizing to secure economic handling of enormous tonnages of lowgrade ore, and the superhuman efforts the company is now making to supply the huge quantities of zinc and lead demanded by war industries, combine to make the information contained in our next issue of particular timeliness and lasting interest to everyone in the mining industry.

ENGINEERING AND MINING JOURNAL

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ALFRED M. STAEHLE, Publisher
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COVER ILLUSTRATION: BETTS PROCESS electrolytic lead refinery of Consolidated Mining & Smelting Co. of Canada, Ltd., at Trail, B. C. Turning out over 700 tons of lead daily, this plant is the largest lead smelter in the world.

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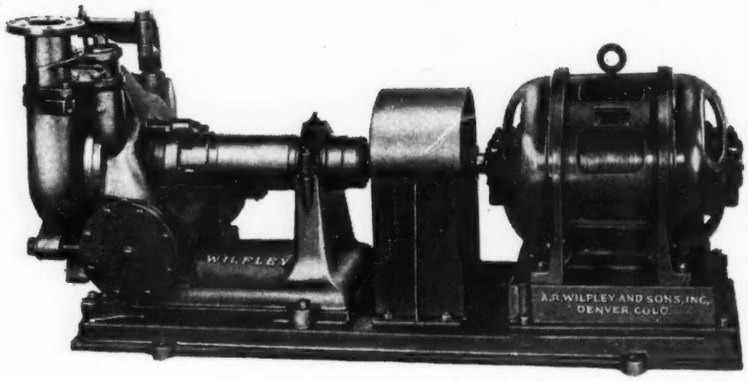

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LIKE a leaf floating downstream, we are being carried along toward a new and uncharted economy. What this new economy will be like will depend, to no small extent, upon what industry does or fails to do during the coming months. Time is short; in fact, we may suddenly find ourselves standing on the threshold of a peace economy with our war boots still on our feet.

While bending every effort to win the war, we cannot afford to be caught unprepared for the peace. As Prime Minister Churchill said at Harvard, we are "bound, so far as life and strength allow and without prejudice to our dominating military task, to look ahead to those days which will surely come, when we shall have finally beaten down Satan under our feet and find ourselves with other great Allies at once the masters and the servants of the future." Unless we do look ahead, there is danger that we may become neither the masters nor the servants, but merely the victims, of the future.

The war has quickened our ailing economy and opened our eyes again to the possibilities of peace-time plenty. But it has also brought great dislocations of labor and capital; it has led to abnormal patterns in prices and income distribution; and it has created inflationary pressures with enormous potential powers to injure or to help us in the transition from war to peace.

The pattern of life in postwar America will be just what we make it. All of us will have a hand in shaping that pattern, but business men will have a special responsibility in the reconstruction. As employers of labor and capital and as enterprisers assuming the risks of new ventures, they will have to plan and carry out the conversion from war work to full peace-time production. Because of their key role, business men have a special opportunity to discover, and to help others to understand, the conditions which are necessary if they are to do their job satisfactorily.

This is a narrow view of postwar problems but it is a central view, because no one condition is more vital to the health of the world than a high level of production and employment in the United States. We cannot hope to lead the world out of economic chaos if we fail to put our own house in order. If we fail to adjust our domestic economy, we may destroy Adolf Hitler; but we will not destroy the germ that breeds "Hitlers." If we do not maintain the production necessary for supporting a large volume of imports and exports, then the plans for international monetary stabilization, for good relations with our neighbors, for rehabilitation of stricken countries, and for strengthening the democratic bulwarks against dictatorship are all likely to come to grief. We must demonstrate our capacity for world leadership, or be content to follow the leadership of others.

The prospects for achieving a sound and vigorous economy in the United States are not so good as to warrant complacency on the part of men genuinely interested in free enterprise and the political freedoms incident to it. We have yet to find means to utilize our vast and abundant resources for the good of all. We have yet to learn how to keep men from the terrible experience of unemployment and the fear of want which makes them willing to sacrifice freedom and opportunity for almost any promise of security. We have yet to reconcile the conflicting interests of labor, agriculture, and business so that they can work together effectively. We have yet to learn how to check the fever of inflation and cure the palsy of depression.

When we were attacked at Pearl Harbor, we realized our physical peril immediately and united in a tremendous common effort against the enemy. The onset of economic perils is less obvious. No bombs will signal the deterioration of the private enterprise system, the extension of regimentation, the further control of busi-

ness by government, and the concentration of political power in less and less responsible hands. If these things should befall us, they will come insidiously while we are preoccupied with self interests and oriented by popular misconceptions. If the freedoms of the individual shrivel as the state grows in power, it will be because the individual is too indifferent or complacent to concern himself seriously with economic problems. If our people are misled by false prophets and demagogues, it will be because business men did not understand economics, because scholars were too ignorant of practical affairs, and because we failed to produce economic statesmen of sufficient stature for the task in hand.

Thinking is hard work. Thinking about things outside our personal experience, about economic processes that are broader and in some fundamental respects different from buying and selling or running a business – is strenuous mental labor. Thinking straight about problems that are beyond our personal and immediate status and our pocketbooks, thinking about problems that involve nation-wide production, nation-wide employment and nation-wide buying power – in other words the operation of our entire economic system – involves real self-discipline. Yet there is no other way to safeguard our freedoms. We cannot rely on trial and error; tinkering takes too long; social experiments which turn out wrong can be undone only at great cost – if at all. If we proceed blindly, we shall flounder into an economic and political morass from which we cannot escape.

We floundered badly all through the Thirties, until the war lifted us temporarily to higher ground. When the war boom is over, we shall be back floundering worse than ever unless we find a solid road along which to proceed.

America has grown rich and strong under a system of political and economic freedom. Opportunity and the necessity of self-reliance have brought forth great accomplishments. The hope of profit and the spur of competition have urged men on to find new and better products, new and better methods, and to risk their savings in pioneer investment. Never has a country achieved so high a standard of living and afforded so large an opportunity for the individual man and woman. It is not surprising that some distinguished business leaders, looking back over their own experience, tell us that everything will be all right if only there is "less government in business."

I wish the solution were as simple as that. However this is only part of the answer. It is becoming increasingly clear that industrial capitalism as we know it contains within itself certain fundamental weaknesses which can lead to its destruction if they are not counteracted. No democracy can survive when twenty to thirty per cent of its workers cannot get jobs. That happened here in the Thirties. For years on end, despite fumbling efforts at recovery one out of every five workers was denied a chance to earn a living in private business. We shall never again have such mass unemployment as occurred in the bottom of the Depression, because the government will take it upon itself to create jobs if business cannot offer them. Whenever that happens, however, the area of private enterprise will be reduced and that of government will be expanded – and the concentration of political power will be increased. This is the challenge we business men face today, and ours is the first opportunity at finding the solution.

The crux of our economic problem is unemployment. Unless there are jobs for ninety to ninety-five per cent of those who are able and willing to work, there will be widespread fear and lack of opportunity, which will drive labor unions, agricultural groups, and business interests to take self-protective measures. Such measures are certain to restrict production, stifle progress, and imperil our democratic way of life. Not all our problems will automatically be solved if we learn how to avoid mass unemployment, but they will at least then have a good chance of solution.

And so American businessmen face a great responsibility! We will have to find the answer to a great many momentous questions. We will have to delve into problems that cannot be solved by precedent.

Looking backward to these times, future historians are likely to say that here we Americans stood at the crossroads and, consciously or not, made our choice between a system of private enterprise and personal freedom and a system of collectivism and regimentation.

It is particularly appropriate, therefore, as the problems of our time take shape and as events rearrange their order and importance, to appraise the steps we are taking and point the way we are going. It is my plan to present such analyses from time to time to the one-and-a-half million readers of McGraw-Hill publications.

President, McGraw-Hill Publishing Company, Inc.

ENGINEERING AND MINING JOURNAL

H. C. PARMELEE, Editor

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Mining Industry Sensitive To Progress of the War

FOR MORE THAN a month the military operations of the United Nations have been so uniformly successful in all theatres of war as to inspire the observation that political and economic preparations were not keeping abreast of the advancing armies. The situation gave point to the argument that, although industry's first job is to win the war, nevertheless political, economic, and even industrial planning must proceed apace if postwar conditions are to be anticipated and dealt with as they arise. The matter is of particular interest to the metal mining industry which operates under numerous governmental controls, and which must continue to produce at top speed until moderation is really warranted.

The first reflection of this condition has just appeared in the case of quicksilver. Of all the war metals this was the only one whose price was uncontrolled, with the result that price, rising with demand, stimulated record-breaking production in the United States, Mexico and Canada. Metals Reserve Company undertook a program of buying surplus domestic production. Mexican output also was absorbed in this country. Canada took care of her own, and became an exporter to Allied countries. Now, however, quicksilver is in such plentiful supply that some domestic producers have been willing to enter into long-term contracts at prices below those generally quoted. Thus the market for this metal discounts the future, and the incident emphasizes changing conditions as the war progresses to its victorious end.

Production of raw materials generally has reached the stage where the earlier intense pressure for ever greater supplies has moderated appreciably. In fact, in a free market, the position of a number of basic war materials would even now be considered easy. This, in part, reflects improved shipping conditions that have followed in the wake of military success. Africa, for example, an important source of copper, cobalt, manganese and chrome ores, and a host of minor metals and minerals, is again contributing its full share to the war effort. This more favorable atmosphere is reflected in the ever sensitive market place, and inclines industry leaders to do more postwar thinking.

Another matter of postwar concern to the mining industry is the stockpiling program being promoted by Senator Scrugham. Despite his diligent and energetic handling of the matter, producers are inclined to feel that it is advancing too slowly to engender a feeling of security from postwar surpluses. They believe, further, that the international character of the mining industry is not being recognized clearly enough, and that a world approach is necessary to handle the problems that loom ahead.

Thus, without diverting their energies from production, mining executives are finding it necessary to keep their eyes on the changing fortunes of war, on economic straws in the military wind, and on such assurance of postwar security as may properly come from the Government.

Friendly Labor Relations

OUR ADMIRATION for the excellent labor relations prevailing in the Consolidated Mining and Smelting Company of Canada, and for the enlightened leadership of that company by S. G. Blaylock, chairman and president, lead us to publish in this issue a brief submitted by him to the National War Labour Board of Canada during its recent inquiry into labor-management relations in the Dominion.

This is not the first time we have published Mr. Blaylock's views on the subject. In our issue for

September 1935 we published an excerpt of his address as president of the Canadian Institute of Mining and Metallurgy. Even at that time he had had a long and distinguished record of good labor relations at Trail, and he pointed the way to similar achievement by all who would investigate and follow his plans and policies. Now, with his country at war, and labor-management relations a prime factor in production, he again enunciates basic principles that make for industrial peace. We in the United States may well heed the lessons he teaches.

The secret of Mr. Blaylock's success is at once easy to understand and hard to practice. It lies in a sympathetic understanding of men and why they behave like human beings. On this score Mr. Blaylock's profound wisdom is of the same order of magnitude as the abysmal ignorance of our own law makers who are swayed by political considerations in writing labor laws. Thus, Mr. Blaylock and Senator Wagner, for example, represent the antithesis of ideas and comprehension of human relations.

Every mining executive should read and grasp the import of Mr. Blaylock's policies. They have worked successfully for more than forty years, and are freely available to all who want to adopt them.

Fact-finding Is Essential for Planning

SENSIBLE and successful planning in the mining industry calls for basic facts and data on which intelligent action can be predicated. The major source of such information in the past has been the Bureau of Mines, through its collection and publication of statistics and economic information in the Minerals Yearbook. This annual volume has been invaluable to the mining industry, and it is a pity that censorship has restricted the continued release of the information formerly made public. Probably it would have been more valuable to the industry than it could have been to the enemy.

When conditions again permit the Bureau to resume this activity, its scope should be expanded. More money and manpower should be made available for its growth and development in order to render the service the industry may reasonably demand. In particular, the international aspects of the mineral industry should receive more attention, and adequate facilities should be provided to supply information on that phase of the industry's business.

Although there are substantial reasons for expecting a good level of general business activity in the years immediately after the war, there can be no doubt that the mining industry will have to make some profound postwar adjustments. Some of these are bound to arise from changes in the relative status of domestic and foreign sources of production and changes in the international flow of minerals. In other words, the domestic producer, whether he wills or not, is bound to take more cognizance of the international aspects of mineral trade than has been his habit in the past.

But whether the factors involved are international or purely domestic, it is folly for producers not to look ahead as far as known facts permit and to plan accordingly. Many new situations will have to be met, and it will be disadvantageous to be caught unprepared. Here is where the Bureau of Mines can be helpful. Fact finding is a logical and laudable activity of government bureaus. Some of the taxpayers' money which is now being lavishly spent in propaganda could be more properly diverted in this direction and be well instead of foolishly spent.

Deferred Development Expense Not to be Regarded as Profit

AS A RESULT of manpower shortage in the mines, plus an accelerated rate of output, a situation has arisen that creates a definite tax injustice to many mining companies, and which should be corrected. The problem involves deferred development expense, necessarily postponed by lack of manpower and pressure for production.

As is well understood within the mining industry, nearly all mines, if they are to remain in production, must maintain development ahead of mining operations for the purpose of finding new ore and making it available for extraction. In typical cases this is a considerable source of expense and ties up a substantial number of employees. Naturally, when this work is deferred because of the need for continued production in the face of serious manpower shortage, considerable sums accumulate that look like profits. However, they are not true profits, and should not be regarded as such because, in order to keep the mines in operation, they must eventually be spent for development. If they are considered as profits and taxed as such, an unjust burden is placed on mining companies, particularly in view of the high rates at which profits are now taxed.

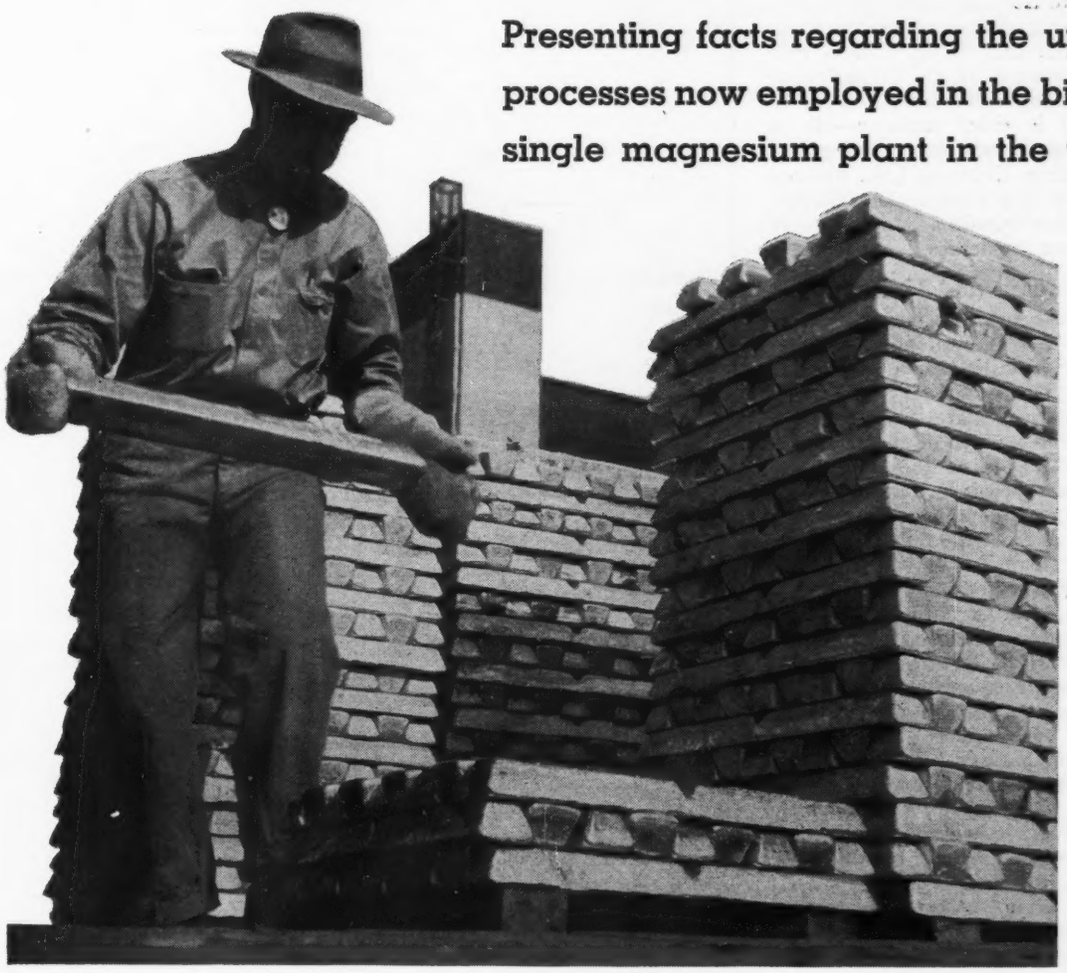
If the provisions of the present revenue code do not permit deductions from income to provide for deferred development expense, the mining industry should take its case to Congress in force. Certainly, if the facts are made plain, Congress will not fail to see that the industry is justly treated in this respect.

E. & M. J. Index, 1943

ON ACCOUNT OF WPB restrictions on the use of paper we shall be obliged to forego customary distribution of the annual index in our December number. We shall, however, be glad to supply an index gratis to all who ask for it. You will help us to print an adequate number if you will send in your request immediately. Just drop a line to the Editor, giving your name and address.

THE WHY AND HOW OF BASIC MAGNESIUM

Presenting facts regarding the unique processes now employed in the biggest single magnesium plant in the world



R. H. Ramsey
Assistant Editor

SOUTHERN NEVADA, at first glance, appears to be populated at present largely by soldiers, faro dealers, and employees of Basic Magnesium, Inc. In fact, BMI, as they call it down there, takes up more space, is the subject of more gossip, has cost more money, and actually turns out more metal than any other one magnesium plant in the world.

It was reported in August to be operating at about 100 percent of capacity. To give you an idea of what this 100 percent means, BMI at full capacity produces over twice as much volume of metal, measured in cubic feet, as one of our larger open-pit copper mines. Furthermore, consider that BMI represents only a part of our magnesium production capacity, and you will begin to realize the magnitude of this new industry of ours.

Basic Magnesium, Inc., was originally the corporate result of a union between Magnesium Elektron, Ltd., chief British producer of magnesium, which was to furnish the technical know-how, and Basic Refractories, Inc., a Cleveland, Ohio, firm headed by Howard P. Eells, who was to supply the raw material and direct the enterprise. Defense Plant Corp. financed the deal whereby a magnesite deposit in Gabbs Valley, Nevada, owned by Basic Refractories, Inc., would be developed, and a reduction plant erected on a site convenient to Boulder Dam power. The contract was signed on Aug. 13, 1941; foundations were being poured in November; and in August, 1942, magnesium ingots were being produced. Construction work was largely handled by McNeil Construction Co., of Los Angeles, although MacDonald Engineering Co., Engineers, Ltd., and Fritz Ziebarth, assisted in setting up power lines, pipe lines, reservoirs, and in other jobs.

Plant design was directed by two MEL technicians, Dr. S. J. Fletcher, chief chemist, and J. R. Charles, chief engineer, of the British company. At first, Charles and Fletcher were asked to design a plant to produce about 45 tons of magnesium daily, but no sooner had they completed this design than they were asked to more than triple this output. In three months these men did a job that might reasonably have occupied a year.

Following the first production of magnesium in August, 1942. however,

the output of metal did not come up to expectations. Although the story of what actually went on during BMI's early operations would undoubtedly be a most interesting one, it has never been completely told and will not be told here. Whatever the cause, the effect was that on Oct. 26, 1942, Anaconda Copper Mining Co., at the invitation of governmental agencies, assumed direction of BMI by buying the controlling interest held by Basic Refractories, Inc. F. O. Case is now general manager, H. G. Satterthwaite is general superintendent, and V. E. MacDonell is chief engineer—all of them are Anaconda men. The status of Magnesium Elektron, Ltd., was not affected by this change, and Charles and Fletcher remain at the plant in their former capacities.

Mine and Mill

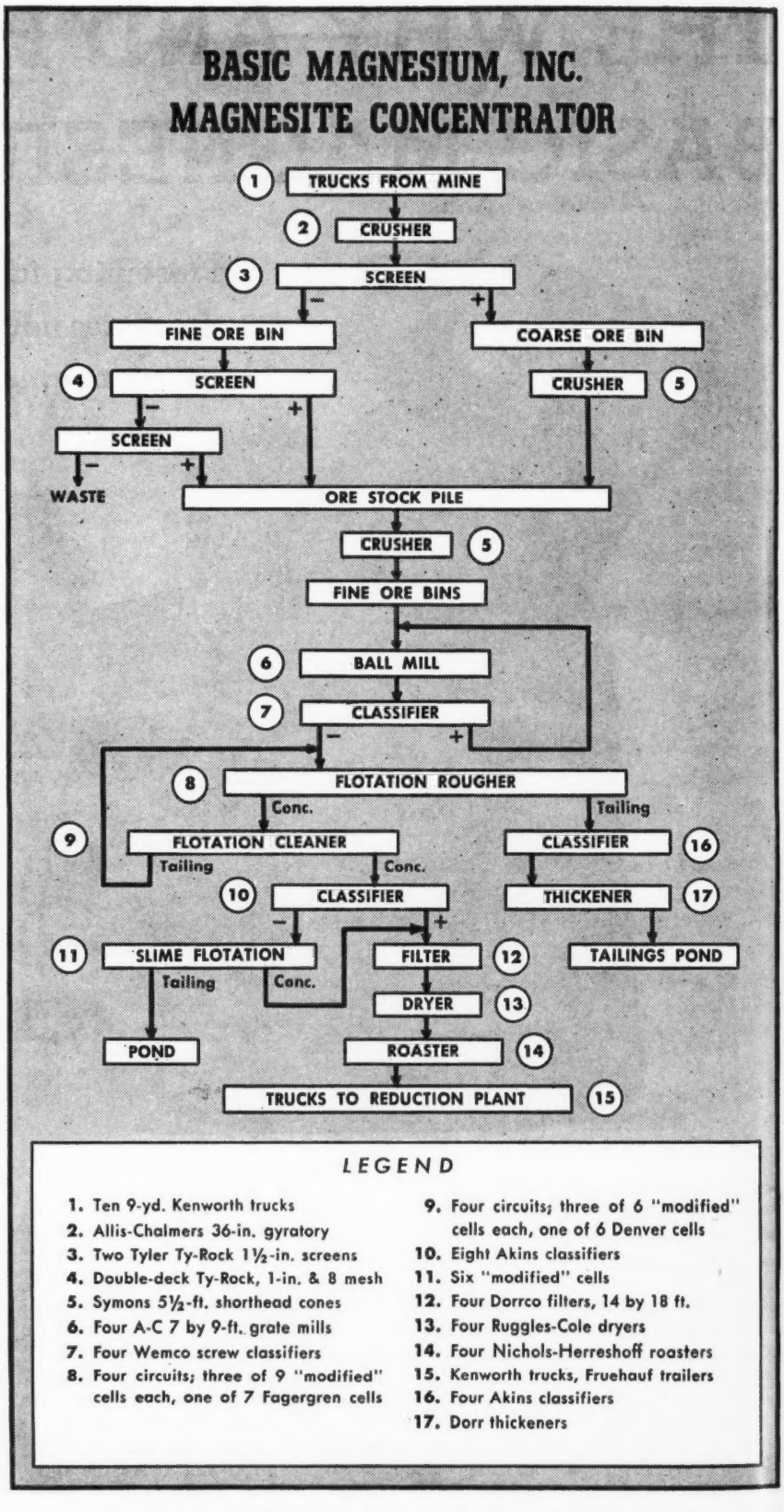
BMI has grown so hugely in the last year, and is even now changing in so many details, that a description of it is a formidable task. Probably the best place to start is at the mine, some 300 miles north of the reduction plant, and far up on the side of one of those vast Nevada valleys. Here, 31 miles from the railroad and 1,100 miles by rail from the reduction plant, is a concentration of almost pure magnesite (magnesium carbonate). Adjoining it is a large deposit of brucite (magnesium hydrate), but this is being worked by other companies. The magnesite outcrops about halfway up the mountain slope above the valley and consists of a dense, thickly bedded, very hard rock in a formation which is variable but generally dips westward, away from the hill. Color of the magnesite varies between a dark blue-grey and a faintly bluish white. Surrounding the magnesite are dolomites of varying composition, except for the deposit of brucite which adjoins it on the south.

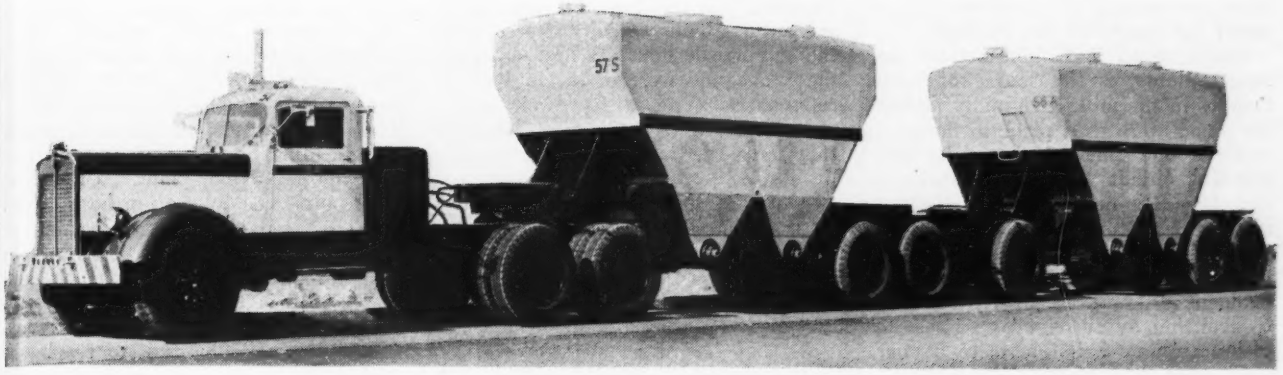
Original development work on the deposit consisted of extensive diamond drilling, which was done on 50-ft. centers, and on the basis of which the estimates of available tonnage and composition were made. When the deposit was opened up, however, it was found that serious variation in composition occurred within narrow limits in the deposit, enough, in fact, to render large parts of it unusable.

Obviously, this complicated the problem enormously, and for a long time mining was done in a cut-and-try manner, which, though expensive, was made necessary by the need of getting ore to the reduction plant. Anaconda's engineers, however, anticipate more success in working out a suitable mining method, and in a few months the mining picture may be different.

The deposit was entered by drilling and blasting out a series of 60-ft. main benches, each divided into three 20-ft. sub-benches, to afford the greatest degree of selective mining. Because of the lack of uniformity of the orebody, a great deal of additional sampling was necessary.

In sections where wagon drills are used for primary blast holes, 2½-in. vertical holes are put down on 14-ft. centers, and all drill cuttings, caught in Worthington dust collectors, are assayed. Two samples are taken from each drill hole, the upper 10 ft. making up one sample and the lower 10 ft. making up the second. Results of



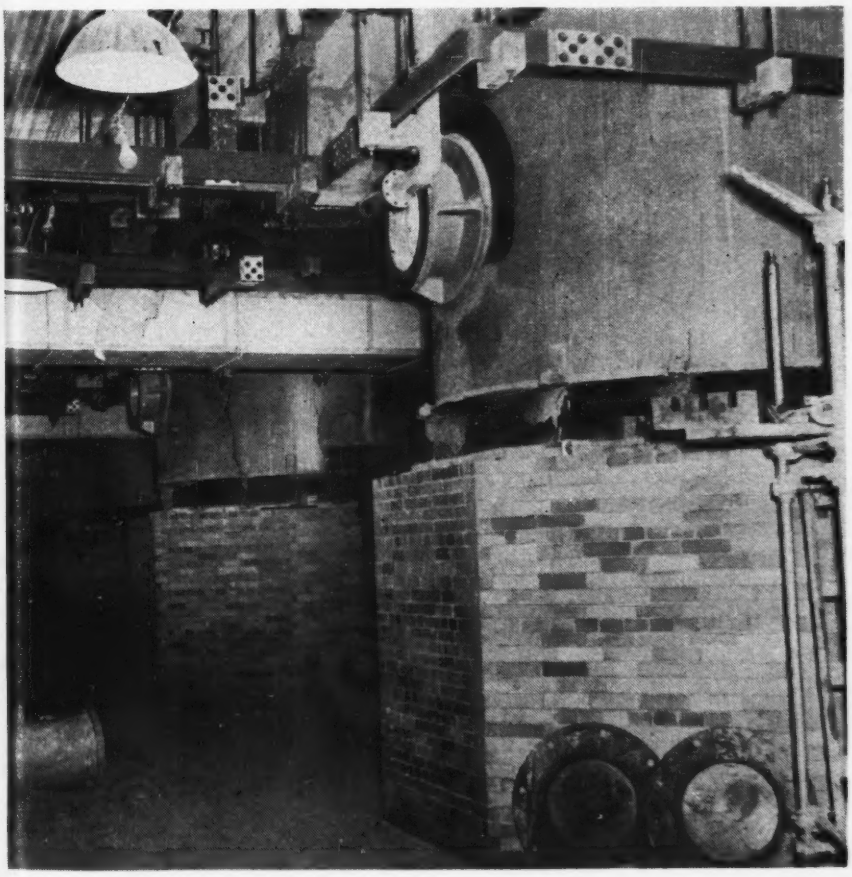


THIRTY TONS of calcined magnesite is hauled in each truck-trailer unit shuttling between BMI's mine and reduction works

this sampling govern the subsequent blasting operation.

Following the decision as to which part of the bench will be regarded as ore and which as waste, intermediate wagon drill holes are drilled between the sample holes, resulting in 7-ft. spacing for primary blasting. Seven Worthington wagon drills are used in this work. All holes are loaded with 65 percent free-flowing powder and detonated with Primacord. Following the blast, in which about 10,000 tons is generally broken, the rock is loaded by 1½-yd. Bucyrus-Erie shovels into 9-yd. trucks, which haul it down the hill, either to the crushing plant or to the waste dump as its composition dictates. Ten Kenworth trucks powered by Cummins diesel engines are used.

The major part of the deposit is worked in this way, but a slightly different scheme has been found feasible for one bench. Here a 40-ft. bench is being cut, for the composition of the rock is more uniform. Drilling is done along this bench by one Bucyrus-Erie 29-T churn drill and one old Armstrong Model 29 drill, both of which put down 9-in. holes. About 20 ft. of hole is drilled before the bits need resharpening.



MOLTEN MAGNESIUM CHLORIDE is formed in the chlorinators, cylindrical electric furnaces, from magnesia, coal, chlorine. Hole in back of each is for one of electrodes

Holes are drilled on 18-ft. centers and samples are taken after every 5-ft. advance in the hole, in order to outline the orebody and determine grade as is done in wagon drilling. Following assay of the samples, the holes are loaded with a powder which gives a detonation velocity of 5,000 to 7,000 ft. per second, and are fired by Primacord. About 18,000 tons of rock is broken per blast on the churn-drilled bench, but secondary blasting is frequently necessary because of the well-defined and widely spaced fracture planes in the rock.

As mentioned in the foregoing, ore sent to the mill must meet certain requirements of composition. It must contain not more than: 4 percent insoluble material, 4.5 percent CaO, or 2 percent FeO and Al_2O_3. MgO content should be about 40 percent. About 2,000 tons of ore per day has been mined in the past.

The general flowsheet of the concentrator is shown in the accompanying diagram, but it should be mentioned that it is like a railroad timetable in being subject to change without notice. Certain of the changes recently made or contemplated are discussed, but procedures may be somewhat different even by the time this article is printed.

The trucks coming down off the hill dump their loads directly into the Allis-Chalmers gyratory crusher, and the flow through the crushing plant is straightforward thereafter. Some 6 percent of the original feed is discarded in the final screening operation as minus-8-mesh material, and is used for road repair. This discard is temporary and will be discontinued when the mine is fully opened.

All minus-1½-in. plus-8-mesh material is delivered to a stockpile about 350 ft. in length, containing a maximum of 45,000 tons. This pile is built up by a Southwestern Engineering Co. 50-ft. stacker mounted on a car which runs back and forth at a constant speed on a track alongside the pile. A good mixing action is thereby obtained in adding fresh ore to the pile. Ore is moved to the mill on a

conveyor running in a concrete tunnel under the length of the stockpile.

Slime, as in most non-metallic flotation plants, is the source of much trouble in the mill. Originally desliming cones were used prior to flotation, and, at one time, feed to the fine-grinding circuit was added directly to the classifiers rather than to the ball mills in an effort to cut down slime production. Both these schemes have been discarded, however, and the slime problem is now dealt with by reagent control and by adjustment of the flotation circuit. Grinding is to 55 percent minus-325 mesh.

A number of different reagents have been used as the work progressed, but at present the combination is as follows: aluminum sulphate, sodium metaphosphate, caustic starch, acidified sodium silicate, and naphthenic acid. By suitable adjustment of reagents and circuit control, the recovery of the magnesite contained in the flotation feed has been raised from an initial 48 percent to about 70 percent, and the grade of concentrate has been improved as well.

The flotation machines used are of three varieties, as shown. The Fagergren and the Denver cells are experimental, and the third type, called "modified" on the flowsheet, was standard but has been radically altered from the original design. As first supplied, these machines were of the individual-cell control type, with a weir and a pulp level control for each cell, but they have been altered to hog troughs by cutting openings between each cell to eliminate the weirs. New impellers of the general M. S. type have been substituted for the original rotors, and experiments were made with the addition of air to each cell. The resultant machine is not beautiful in appearance, but improved metallurgical results have been obtained with it.

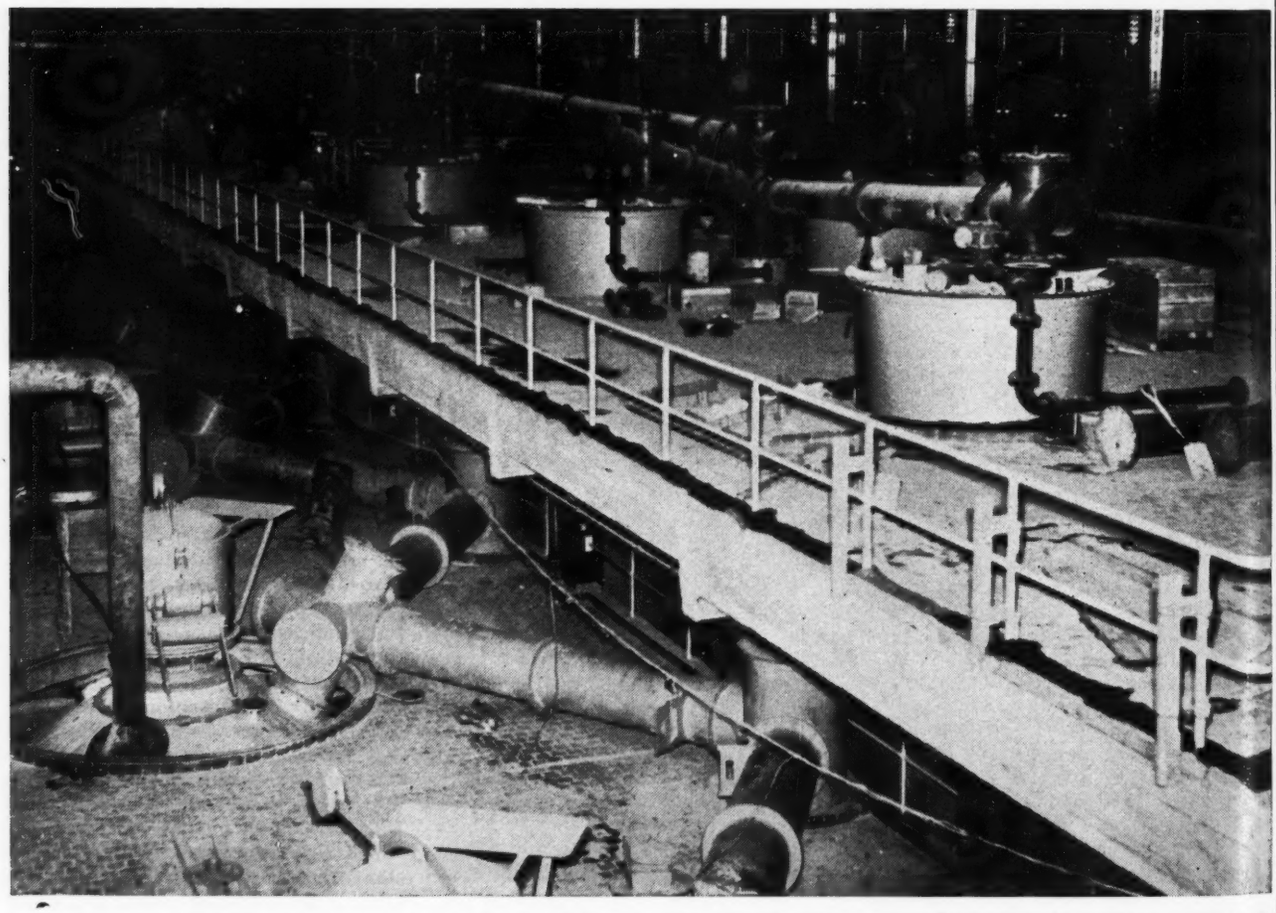
Truck Transport Used

As shown on the flowsheet, filtered flotation concentrate passes through rotary dryers and on to four 14-hearth Nichols-Herreshoff roasters. Trouble is now being experienced with the dust-collecting system in this part of the plant, and the possibility of bypassing the dryers altogether is being considered. Filtered concentrate would then go directly to the roasters, eliminating some dusty handling of concentrate and dust loss in the dryers.

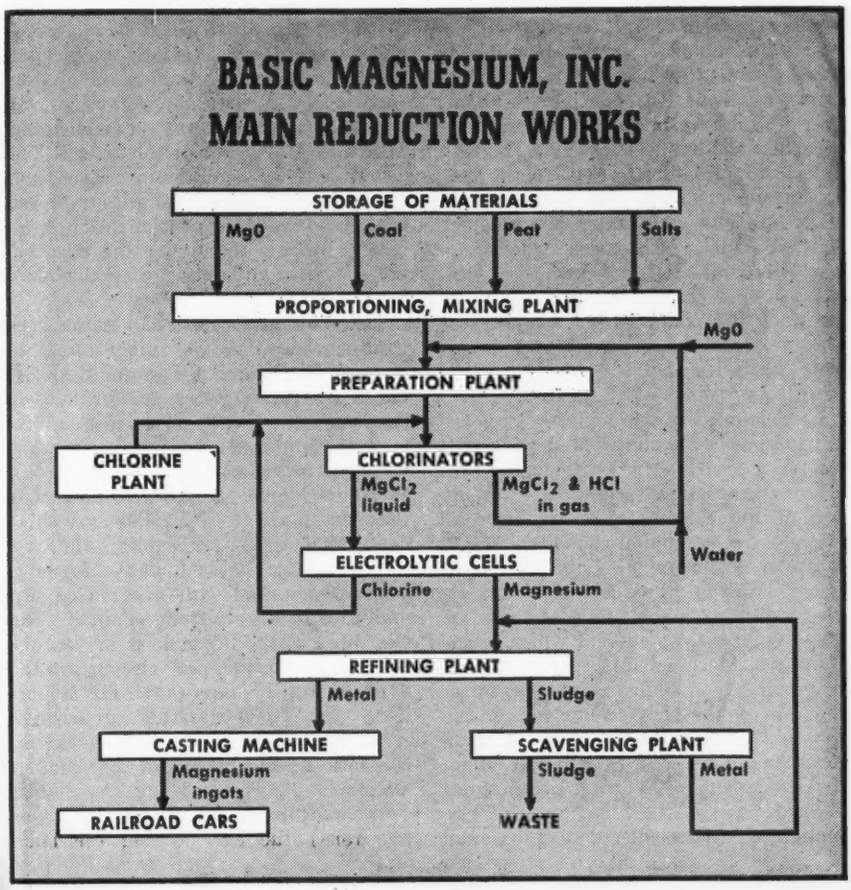
Calcined magnesite is carried to the railroad by Kenworth truck units, each pulling two 15-ton Fruehauf semi-trailers. The truck units are powered by Cummins diesel engines, type HBSD6, equipped with superchargers; the trailers have specially designed bodies made in the form of bottom-discharge hoppers, the gates of which fit unloading bins at both the railroad and the reduction plant. Unloading is accomplished by suction hoses aided by screw conveyors in the bottom of the trailer. Loaded, the gross weight on the highway of each truck and trailer unit is 105,020 lb. At present, the calcines travel 31 miles by truck, then 1,100 miles by rail, to reach the plant; but as soon as sufficient trucks are available, the long rail haul will be eliminated and calcines will be trucked the 300 miles directly to the reduction works.

Southwestern Engineering Co., Los Angeles, Calif., did the engineering work for the concentrator, and Macdonald Engineering Co. built it. T. C. Russell is superintendent at the mine and concentrator; C. P. Donohoe is assistant superintendent and metallurgical superintendent; K. R. Crocker is mine superintendent; G. W. Nielsen is mill superintendent, with R. V. Thompson and Ray Handy assisting.

There is so much going on in the mile-long beehive of BMI's main re-



TOPS OF CHLORINATORS, in a row at left, include a charging device for feeding material with minimum escape of gas. At right are exhaust gas scrubbing towers in which magnesium chloride and acid vapors are removed from chlorinator fumes



duction plant, and it all sprang out of the desert so fast, that one can't avoid a feeling of unreality as he is shown through the huge buildings. In fact, the structures themselves heighten this effect, for they were designed on modernistic lines totally unlike anything ever before seen in an ordinary mining camp. I suppose the comparison has been overworked by this time, but the impression is inescapable that these blocky, broad shouldered buildings must have been erected overnight by a crew of genies of the sort who used to handle Aladdin's construction jobs. He got results by rubbing a lamp; we got BMI by writing a check for a hundred million dollars. Personally, I don't believe in either one of these operations, but the reality of BMI is nevertheless indisputable.

Reduction Plant Operations

Sequence of operations in BMI's sprawling main reduction plant is as follows: (1), calcined magnesite, mixed with coal and peat and suitably prepared, is heated in electric furnaces (hereafter called chlorinators) in an atmosphere of chlorine; (2), the anhydrous $MgCl_2$ formed in the chlorinators is transferred to electrolytic cells wherein molten magnesium collects in a pool on the electrolyte's surface; (3), dipped out of the cell by hand, the molten magnesium is then refined and cast into bars. In addition to these main units, the preparation plant, the chlorinators, the cell houses, and the refining plant, the company also operates a chlorine plant, a flux preparation plant, a caustic soda plant, a brine plant, and a $MgCl_2$ liquor preparation plant, most of which are as large as any similar units operating elsewhere.

As indicated in the accompanying flowsheet, upon arrival at the reduction works, concentrates are transferred by Fuller-Kinyon equipment into one of five 60-ft. silos, each of which holds about 5,000 tons. For use in the BMI process these concentrates must contain less than 1.5 percent CaO, 1 percent insoluble matter, 0.5 percent each of FeO and Al_2O_3.

The other primary constituents of the feed to the reduction plant are peat moss from Canada, coal from Utah, and certain salts of unspecified composition which assist in the subsequent reactions. Coal acts as a reducing agent and peat makes the mixture porous. Incidentally BMI has absorbed a substantial part of Canada's output of peat and will continue to do so until current experiments looking toward the elimination of peat as a necessary constituent are successful. For use in the process, the peat is shredded in a hammermill to minus 8 mesh. The coal and the salts are ground in Raymond pulverizers to minus 200 mesh, and all three ingredients are then stored in small concrete silos.

These materials—magnesia, peat, coal, and salts—are removed as needed by belt conveyors to the proportioning plant. Here each is weighed out of its respective bin by Jeffrey Waytrols and sent by screw conveyor to one of several rotary mixers. From these mixers the charge is fed continuously to several pug mills in which concentrated magnesium chloride solution is mixed with the dry mass until a thick dough has been produced. This magnesium chloride solution is obtained by mixing calcined magnesite with HCl obtained from the chlorinator exhaust gases. Between this point and the chlorination step, two processes are followed. The purpose of each is identical; that is, it is desired to dry the dough in pellet form so that it will make a more suitable feed for the chlorinators.

In one part of the preparation plant, the dough from the pug mills is extruded by a screw conveyor through a rectangular opening about 8x10 in. in size and cut into 2-in. bricks which pass on a metal conveyor through a drying oven. They are then loaded on small cars and conveyed through a tunnel kiln, where a heat is applied sufficient to cement the mix but not hot enough to more than char the peat in the mixture. These hard blocks are then broken up into 2-in. lumps for chlorinator feed.

In the other part of the plant, the dough from the pug mills is fed to rotating cylinders in which the pasty mass is broken up and formed into a collection of balls or pellets averaging about an inch in diameter. These pellets are discharged into dryers and then pass into one of four Kennedy-Van Saun rotary kilns, each 100 ft. long. The same temperature conditions are maintained in these kilns as in the tunnel kilns already mentioned. After passing through water-cooled cylinders, the rotary kiln product is ready for the next step.

The pellets of mixed and dried raw material are transported to the chlorinator buildings in trains of small dump cars, each one a kettle-shaped pot holding perhaps 300 lb. of pellets. These chlorinator and electrolysis buildings are the most prominent feature of the BMI plant. Each one covers about the area of a football field, and they are several stories high. Each building is divided into two main rooms; in one of them are placed eight chlorinators, and in the other and larger room, 88 electrolytic cells. Before going into more detail about these units, however, it might be well to have a look at the plant now supplying chlorine to the process.

With a capacity of about 200 tons

of liquid chlorine per day, BMI's chlorine plant is one of the largest ever built. Engineered by H. K. Ferguson Co. of Chicago, it uses standard Hooker cells, which obtain chlorine by electrolysis of salt water. These cells are housed in two buildings, 450 cells in each one. Salt is obtained by special government permission from Death Valley and is dissolved in water in Dorr turbo-agitators. The solution is brought to the proper concentration in large evaporators and is then pumped through the cells.

A current of 750 amp. is applied to the cell circuit; voltage drop is about 3.3 per cell. Chlorine is evolved at the anode in the upper part and removed through the top of the cell. Hydrogen gas forms at the cathode and is removed through the back of the cell. Sodium hydroxide also forms at the cathode and passes out of the cell with the waste liquor, which contains about equal parts of salt and sodium hydroxide in solution.

Because chlorine is released in the electrolysis of magnesium chloride, most of the chlorine used in the chlorinators will come directly from the cell house, and eventually the chlorine plant will be required only to make up losses in the circuit. When this balance has been attained, BMI will have available for sale much of its excess production of liquid chlorine.

To get back to the chlorinators, to which the chlorine is pumped in the gaseous state: These are cylindrical furnaces about 12 ft. in outside diameter and 25 ft. high, consisting of a metallic shell inclosing a refractory lining. In this shell are a bell-hopper arrangement at the top for introducing the pellets, an inlet for chlorine gas, six openings through which carbon electrodes project into the interior, a port for the removal of waste residues, an exhaust port where gases escape from the furnace, and a tap hole near the bottom where molten $MgCl_2$ is removed.

Operation of these units appears fairly simple. About 300 lb. of fresh dry mix, prepared as outlined in foregoing paragraphs, is dumped into the top of the chlorinator every hour or so, and the accumulated molten $MgCl_2$ is drawn off below, also about once an hour. Inside the chlorinators, the electrodes, arranged in two sets of three each, carry a current which maintains an interior temperature of over 850 deg. C., or sufficient to permit reduction of the MgO contained in the dry mix. Under these conditions magnesite combines with carbon and chlorine to form anhydrous magnesium chloride and carbon monoxide. The molten chloride collects in the lower part of the furnace. Exhaust gases of the chlorinators, which carry hydrochloric acid and some magnesium chloride as well as carbon monoxide, pass through scrubbing towers and various solution tanks in which the HCl and $MgCl_2$ are dissolved out. The resulting acid solution is then neutralized with calcined magnesite, evaporated to a high concentration, and stored for use in mixing the "dough" which eventually constitutes the chlorinator feed.

Left behind in the chlorinator is a residue composed of silica, alumina, iron oxides, and other impurities. Because these impurities are present in small amounts, they do not accumulate rapidly, and only after about three weeks of operations is it necessary to shut the chlorinator down to clean out these residues. Electrodes are also changed or dressed up at this time.

When it is desired to tap a furnace, a truck-mounted ladle is moved up underneath the tapping point. The clay plug in the tap hole is driven out and a red, very liquid stream of anhydrous $MgCl_2$ pours out. The liquidity of the $MgCl_2$ is rather surprising; it flows and splashes like water in contrast to the behavior of molten metal.

When full (each ladle carries about two tons) the car bearing the ladle

MAGNESIUM ELECTROLYSIS is accomplished in cells like the one shown above, with 88 of them in a unit. Electrodes project through the top, molten chloride is poured in through small doors in front, molten metal is dipped out through the same openings

is driven to the nearby banks of electrolytic cells, each one of which has openings in the top fitted with small doors. These doors are opened in turn, a funnel-like apparatus is inserted into the opening, and the molten chloride is poured into the cell through the funnel. A ladle-full suffices to re-fill several cells, and when it is empty the ladle is immediately returned to a different chlorinator.

These cells, arranged in eight rows of eleven cells each, are low receptacles about the size of two bathtubs placed side by side. Tanks are of steel, but the entire lining is of a refractory material. Through the covers of the cells project the electrodes, six steel cathodes and three graphite anodes, and an exhaust pipe through which chlorine leaves the cell. The gas escapes at the anodes and is caught by shields which inclose the anodes to a depth well below the electrolyte surface. Magnesium metal forms at the unshielded cathodes and gradually collects in a pool on the surface of the chloride. Looking into the cell, one sees the bright-red surface of the molten chloride swirling violently under the pull of the cell's magnetic field. Swept here and there on this surface are numerous shiny globules of metallic magnesium, the drops which eventually coalesce to form a pool of the metal several inches deep. When this condition has been reached, two men dip out the molten metal into a gas-heated ladle for transfer to the first casting operation. Thereupon more chloride is poured into the cell and the cycle is repeated. Magnesium is removed from each cell about once each day.

Enormous Power Outlay

The impure magnesium taken from the electrolytic cells is carried in the truck-mounted ladle to a row of molds at one side of the cell room. In these molds, which resemble oversize dishpans, the magnesium is cast into short cylindrical pigs, each one weighing about 60 lb. These pigs are then removed as needed to the refining plants. Efficiency of the BMI electrolysis is well over 85 percent.

To supply the 20,000-amp. current required at BMI, both motor-generator sets and mercury arc Ignitron rectifier equipment are used, with rectifiers supplying 60 percent of the power. No one manufacturer could have furnished the huge outlay of d.c. equipment required; therefore Westinghouse, General Electric, and Allis-Chalmers combined to fill the order. Total power used in the entire plant is 220,000 kw., enough for a city the size of Los Angeles. In the actual electrolysis, about 8 kwh. are used per pound of magnesium produced. Power enters the plant at 232,000 volts, is transformed down to 13,800 volts, and the portion used for electrolysis is then converted to d.c.

BMI now has a fine new refining plant, and others are being built, but in the early hurry-up days of the operation, magnesium was refined "by hand," so to speak, because demand for the metal was so urgent. In fact, one of the original refining plants is still operating in order to keep the flow of magnesium ingots at its maximum, until new units can be built.

Old and New Refineries

In this plant the impure magnesium pigs are melted in one of a series of small pot furnaces. A flux, consisting largely of powdered metal chlorides and fluorides, is then stirred through the molten metal and the resulting sludge is allowed to settle. When the magnesium is judged sufficiently pure, it is poured into a series of 5-lb. molds lined up on a nearby bench. Two men handle the pot, which is supported by a block and tackle from an overhead track, and one man stands before the mold bench tossing occasional handfuls of sulphur into the ladle and over the molds as they are filled. This latter also skims the film of oxide from any of the ingots upon which it seems to be forming too thickly. It is obviously a stopgap method which filled in until the new refining plants could be built, but it served its purpose for immediate production.

The contrast between the old and the new plants is amazing. The new refining unit is housed in a separate building, and in this one unit nearly all of the current output of metal can be refined. Along one side of the central room of the refining plant, large enough to resemble a good-sized copper or lead refinery, is a raised platform built around eleven pot furnaces, heated by oil, and each one holding two tons of molten metal. The raw magnesium pigs from the cell houses are melted and purified in these pots by the method already described. When the sludge has settled to the bottom, the pot itself is lifted bodily out of the furnace by an overhead crane and is transferred to one of three casting machines located along the opposite wall of the room.

These casting machines, made by International Derrick & Equipment Co., consist of an automatically controlled tilting frame to hold the 2-ton pot of magnesium, and an endless chain of 5-lb. molds to receive the molten metal. The frame is, in fact, a tilting furnace, for it is heated by propane gas in order to keep the metal at the proper temperature during the pouring. Tilting of the frame is synchronized with movement of the mold chain so that each mold is filled with exactly the right amount of metal. One side of each mold is built up in a V shape which overlaps the low side of the neighboring mold, so that no metal is spilled as the chain advances. Movement of both furnace and chain is entirely smooth at all times, and the choking atmosphere of SO_2 which surrounds the hand operation is absent. A reducing atmosphere does surround the molten metal until it solidifies, but none of the fumes escape.

Care is taken to prevent pouring out of the pot any of the sludge which has settled to the bottom of it, and when all possible pure metal has been poured out, the tilting furnace is returned to an upright position and the pot taken out of it. The empty pot is transferred to the cleaning room nearby and a fresh pot is immediately placed in the casting machine. Two overhead cranes serve the refining room, and so rapidly do they carry the 2-ton pots on the round from furnace to casting machine to clean-up and back to furnace that there is never a break in the procession of trucks leaving the refining room loaded with magnesium. Even when an empty pot is exchanged for a full one at one of the casting machines, there is only a short pause in the steady clinking of ingots dropping from the end of the mold chain.

Women Handle Ingots

In the cleaning room, the pots are entirely emptied of sludge, and as much metal as possible is recovered. After a rapid inspection and cleaning, the pots are swung out again and put back into the nearest empty furnace to be refilled with raw magnesium.

Adjoining the refining room is storage space for ingots awaiting sampling, inspection, and weighing. Beyond the stacked ingots are assembly-line arrangements run by women, in which approved ingots are wrapped for shipment. This bare statement of fact does these women an injustice, however, for they work with a sort of desperate urgency unmatched anywhere else in the plant.

One could easily, and perhaps someone will, fill a book with the whole story of this enterprise. Aside from building the main plant, the erection of the workers' townsite, complete with air-conditioned houses, schools, and stores, is a major achievement, as is the construction of the power lines and pipe lines into the plant. Every type of engineering skill and experience had a part in this project, and is working right now to expand its production even beyond the incredible limits set originally. As to the future of this young giant, your guess is as good as anyone's, but its present and its past are written large across a square mile of Nevada desert and hundreds of square miles of Axis sky. BMI's men don't worry about tomorrow just yet; they are too busy turning out the magnesium we need today.

New Type Concentrator Cut

Here is the first published description of a 1,000-ton gravity concentration unit which occupies a space no larger than your living room, employs no moving parts, requires practically no supervision, yet equals or betters metallurgical results of conventional methods

John B. Huttl, *Assistant Editor*

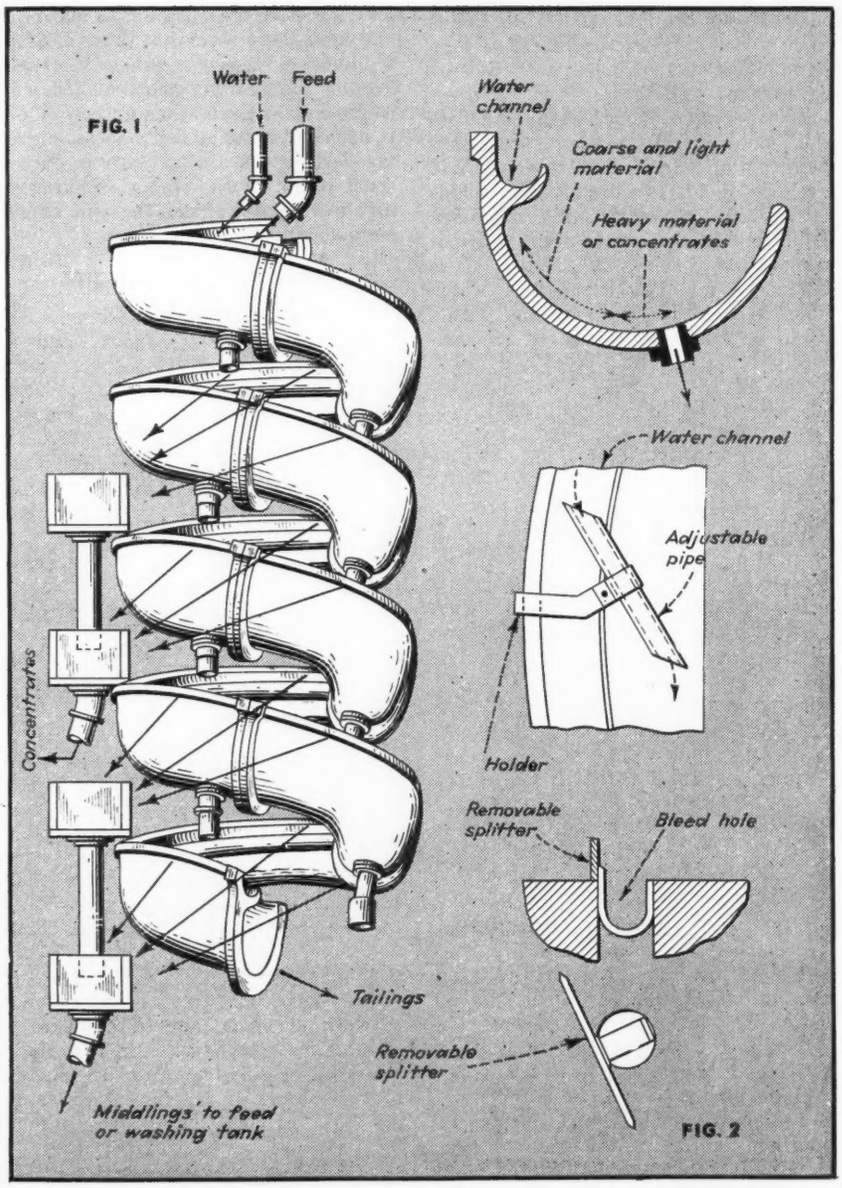


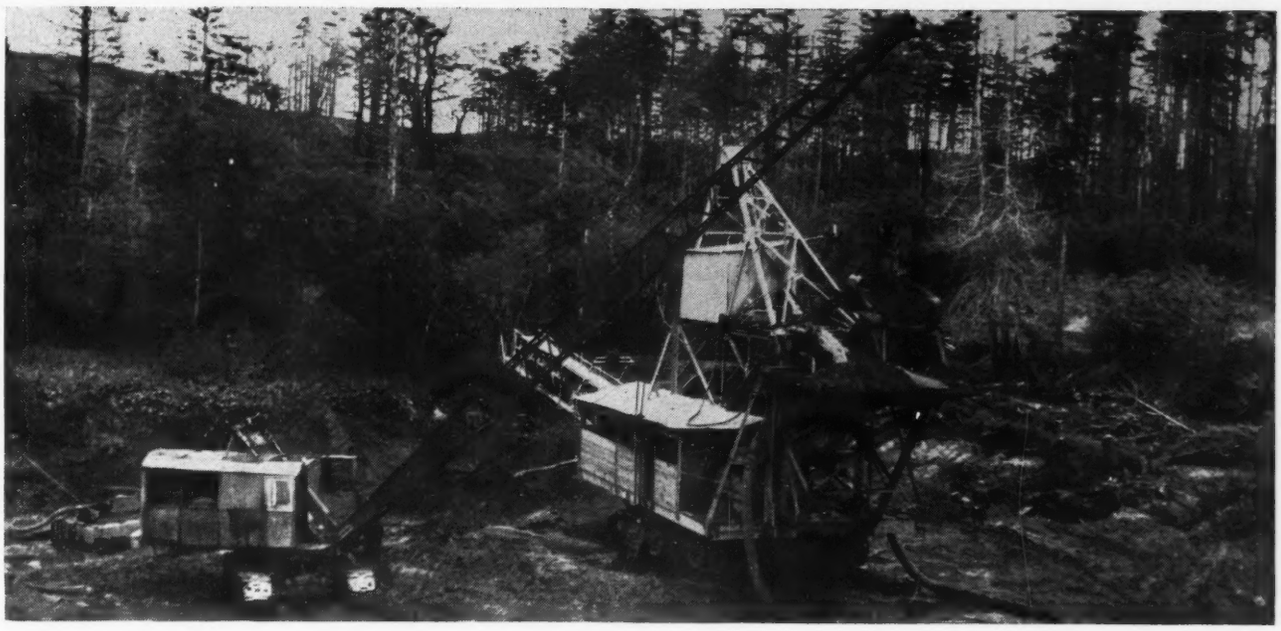
Fig. 1 . . . Heart of the Humphreys concentrator is this cast-iron spiral launder system. Centrifugal force does the work. Fig. 2 . . . Cross-section of launder showing product distribution and methods of supplying wash water and splitting out concentrates

ONLY RARELY is it possible for a technical publication to record the development of an entirely new metallurgical process or method, and that rarity makes it particularly gratifying to describe the new chromite concentrator being operated by Humphreys Gold Corp. at its property near Bandon, Coos County, Ore. By a simple enough application of centrifugal force, consisting of passing pulp through a system of spiral launders, metallurgical results have been achieved which equal or surpass those of orthodox methods, and a remarkable degree of simplicity and economy has been maintained.

Invented by I. B. Humphreys, vice president of the company, the spiral launder system was developed, after considerable test work, with the purpose of using it on the company's dragline dredges for recovering fine gold. The mine closing order intervened, however, and the company transferred its activities to strategic mineral production, particularly the recovery of chromite from marine black sand deposits in Oregon. Unable to obtain quick delivery of conventional concentrating equipment, Mr. Humphreys tested the spiral launders on the chrome-bearing material, and when the results were more than satisfying, the company erected a 1,000-ton concentrator using the new apparatus.

Elements of the present plant include: a diesel-powered dragline with a 1½-yd. Essco bucket for mining the material; a preliminary screening and washing plant mounted on caterpillar treads; a desliming unit of unconventional design; and the spiral launder concentrator unit. These, together with accessory pumps, a classifier, another small dragline, and a few trucks, make up the equipment with which the company mines 1,000 tons per day of material containing 6 percent Cr_2O_3 and concentrates it to 25 percent Cr_2O_3 with a recovery of better than 90 percent.

Chromite Dressing Costs



HUMPHREYS GOLD CORP. uses unique equipment to treat Oregon chrome sands

Current mill feed is obtained from a deposit of old tailings from the Pioneer and the Eagle mines, both of them gold producers which used conventional placer mining methods and were not interested in black sand except as it clogged their sluices. Mined by the 1½-yd. dragline, the tailings are dumped into the hopper of the portable washing plant shown in the accompanying photograph. This unit incorporates the trommel screen, spray pipe, and stacker of the regular dragline dredge. The screen plates have ¼-in. openings, and undersize is collected in a steel sump under the screen, oversize going out the stacker.

The washed and screened material in the sump is sent by means of a 10-in. sand pump to an ingenious washing and classifying unit mounted at a distance near the concentrator. This unit, shown in Fig. 3, consists of a square wooden box with a hopper-shaped bottom into which the washing plant product is dumped. Projecting into the center of the box is an arrangement of pipes which resembles an air lift, with water instead of air as the active medium. Construction of this "water lift" is shown in the sketch. Feed to the concentrator enters the 8-in. pipe through the slots in the lower end of it, passes up the pipe and on to a 6-in. pump which sends the pulp on to the spiral launders.

Control of the flow of solids to the concentrator is obtained by raising or

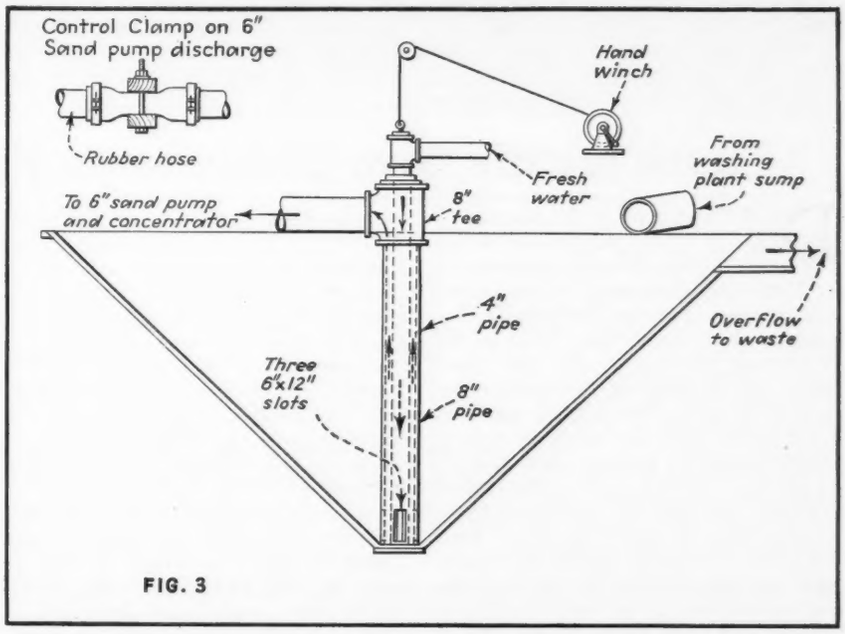


Fig. 3 . . . Preliminary washing and classifying tank for desliming concentrator feed

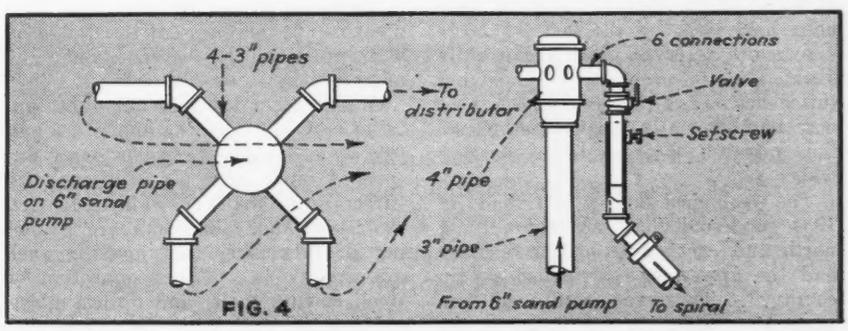


Fig. 4 . . . Piping arrangements for distributing washed pulp to spiral concentrators

lowering the 4-in. fresh-water pipe inside the 8-in. pipe. At its lowest position, maximum movement of solids occurs; when it is raised to a point about 18 in. above the slots, feed of pulp is cut off entirely. Density of the pulp in the tank and the amount of slime overflow are controlled by the amount of water admitted to the 4-in. pipe. The 6-in. pump discharge—that is, the total flow to the spiral concentrators—is controlled finally by the simple clamp arrangements shown in Fig. 3.

One of the most surprising things about the spiral concentrator is its small size. To treat 1,000 tons daily, four batteries containing six spirals each are used, and the total space occupied by these units is about that of a large living room or office. Their operation requires practically no supervision after the feed rate and the auxiliary control devices have been set; and because there is not a single moving part, no maintenance work has to be done. Feed is received at from 7 to 10 percent solids, and averages 6 percent Cr_2O_3; concentrates average 25 percent Cr_2O_3, and recovery is better than 90 percent.

In design, the spiral launder somewhat resembles the spiral picker used at some coal-cleaning plants, in which dry coal, being approximately rounded in form, slides down the chutes faster than the flat slate and therefore works to the periphery of the spiral and discharges separately from the slate. The opposite effect takes place in the Humphreys spiral, which is a wet operation. Here, chromite and gangue separate under the influence of their velocities and the pull of centrifugal force, the slower-travelling chromite particles working toward the center of the launder, and the coarser and lighter gangue travelling along the periphery, as shown in Fig. 2. Wash water is bled from a channel built into the outer rim of the spiral by short adjustable pipes placed at intervals along the launder; and concentrates in the upper rings of the spiral and middlings in the lower, are cut out by adjustable splitters and drop into pipes let into the launder bottom.

Each spiral unit is made up of several short cast-iron sections bolted together. A cross-section of the launder is shown in Fig. 2, and the arrangement of a single unit is shown in Fig. 1. There are 13 ports through which concentrates and middlings are drawn from each unit, and these connect through rubber hose sections with their respective launders. Tailings discharge to waste at the bottom of the spiral, middlings are returned to the washing and classifying tank, and concentrates go to a small drag classifier, the dewatered product of which travels on an inclined belt conveyor to a stockpile. A small drag-line with a clamshell bucket loads the concentrates from the pile into 10-ton trucks for transportation to the Defense Plant Corp. mill near Coquille, Ore. This plant, described in last month's *E.& M.J.*, employs magnetic separation to raise the grade of the concentrate to 40 percent Cr_2O_3.

The simple distributor used to feed the 24 spirals is worthy of note. The 6-in. pipe from the washing classifier pump ends in a spider assembly of four 3-in. pipes. Each of these smaller pipes leads to one spiral battery, where it ends in a short 4-in. nipple to which are fastened six small pipes in the manner shown in Fig. 4. Each of these small pipes feeds one spiral unit. Valves are provided in these small pipes, and because they are fixed to the main distributors with setscrews, they may be easily detached.

I wish to thank A. E. Humphreys, president of Humphreys Gold Corp., for permission to publish this article, and to make grateful acknowledgment of the information given me by I. B. Humphreys, vice-president, and D. G. Brown, who directs operations at the property.

Rare Metals Give Yellowknife New Importance

DISCOVERIES made in the summer of 1943 by a field party of the Mines and Geology Branch, Department of Mines and Resources, Ottawa, Canada, suggest that the Yellowknife district north of Great Slave Lake in the Northwest Territories and 700 miles north of Edmonton, heretofore regarded as a "gold country", may become a source of tin, tantalum, columbium, beryllium, lithium, and indium, at present vitally needed by the United Nations. The minerals containing these metals were mostly little more than laboratory curiosities only a few years ago, but are now of steadily increasing importance in the new age of light metals and rare-metal alloys. To a considerable degree the extended use of some of the metals seems to have been held back by the lack of large known ore reserves. The Yellowknife district shows promise of remedying this deficiency as the occurrences there may be sufficiently large to stimulate the research necessary to develop wider use.

The Geological Survey of Canada in 1934 suggested that the region lying north and east of Great Slave Lake had the appearance of being a "tin country". This was confirmed two years later when tin was found in the Outpost Island ores. Last year a tin-bearing deposit was staked by prospectors for Consolidated Mining and Smelting Company, and this year a number of tin-bearing pegmatite dykes carrying coarse cassiterite, an ore of tin, were found by the Geological Survey about 35 miles northeast of Yellowknife and 10 miles north of Thompson Lundmark gold mine.

A specimen of tantalite, the ore of tantalum, from Ross Lake, 45 miles northeast of Yellowknife, appears to be among the purest known. The first tantalite identified in Canada was found 50 miles northeast of Yellowknife in 1938 and a few other occurrences were later found there and in Quebec. Its closely related mineral, columbite, is more widely distributed in eastern Canada and has also been identified in samples sent to Ottawa by a trapper in the barren lands 150 miles northeast of Yellowknife.

A search for the rare minerals, tantalite and columbite, in the past summer by a Geological Survey party uncovered more than 50 additional occurrences in the Yellowknife district. Tantalum and columbium are becoming of increasing usefulness in such differing fields as the preparation of steel, cutting tools, and optical glass.

Minerals containing beryllium and lithium were first found in the Yellowknife district in 1935 by the Geological Survey. The chief known concentrations of lithium minerals in the Northwest Territories lie 40 to 70 miles east of Yellowknife and rank with the best in the world. Beryllium and lithium are the two lightest metals known, the specific gravity of the latter being only slightly more than half that of water. Beryllium is used chiefly in beryllium-copper alloys, fabricated into springs, diaphragms, and various mechanical parts that are subject to wear, vibration, or shock. Lithium and its compounds have several war uses, one of the more important being the use of lithium chloride as a drying agent in air conditioning units.

Indium is another of the rare metals, important uses for which in bearings, reflectors, and solders have been developed only recently. In 1937, H. V. Ellsworth, of the Geological Survey, suggested that the Yellowknife district might be expected to contain indium-bearing ores. Specimens collected later that year showed traces of the metal. This year two of the larger Canadian mining companies are investigating deposits in the Yellowknife area as a source of indium.

Samples from several of the rare metal deposits in the area are en route to Ottawa for testing.

PRACTICING WHAT HE PREACHES, President Blaylock confers on amicable terms with the executives of Consolidated's Workmen's Cooperative Committee. Forty years of progressive labor relations form the background of his opinions

The Basis for Good Labor Relations

S. G. Blaylock, *President and Managing Director, Consolidated Mining & Smelting Co. of Canada, Ltd., Trail, B. C.*

Mr. Blaylock believes that cooperation between management and men, the true goal of labor relations, will never be achieved in either the United States or Canada under present legislation. This extract from a brief recently submitted to the National War Labour Board at Ottawa lays down what he considers basic premises and sets forth concrete proposals for putting postwar labor-management relations on a firm, equitable, and mutually beneficial footing—*The Editors*

UNQUESTIONABLY the greatest single factor in a country's production is the relationship between labor and management. It is most apparent that there is much to be desired in this connection in Canada. Labor has been led to believe that it is being exploited, and industry is just as much convinced that it is being held up. Workmen believe that their companies are growing wealthy at their expense; industry sees its costs going up even in excess of that increase which might be accounted for by the higher wages in effect. In many cases wage increases have gone far beyond the increase in the cost of living. Under ordinary circumstances one would expect wages to increase slightly more

DEMOCRACY IN LABOR RELATIONS, the author feels, is an accomplished fact at Consolidated, where every department and all minority groups are represented on the Workmen's Cooperative Committee. This bargaining group "has won more wages, more security of employment and better conditions generally" than obtain in any other company in Canada

than the cost of living, due to the fact that the standard of living is also steadily increasing. However, in the present case the increase in earnings is frequently from three to four times the increase in the cost of living. It is also true that frequently the work done per hour has been reduced.

Even the slightest investigation will convince an impartial observer that our Canadian workmen are not disloyal individually, nor are they unreasonable. On the other hand, I do not think that industry can be accused of trying to take advantage of the war effort to reduce wages. It must be quite evident that very powerful and far-reaching conditions exist. The influence of these conditions is so great that a thorough investigation could not possibly fail to identify them. Once the trouble is located it should be fairly simple to correct it.

True Collective Bargaining

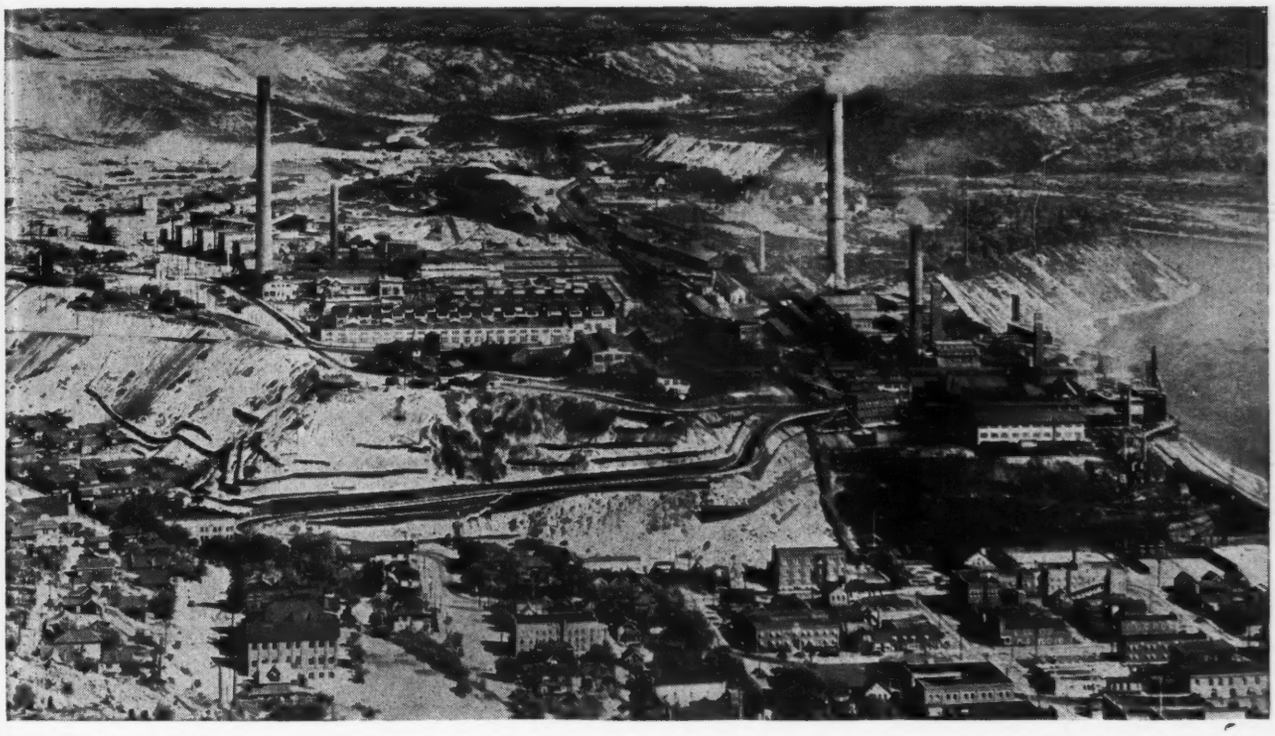
It is my belief that the trouble is almost entirely artificial. Unquestionably the country's emergency is being used by some leaders of international labor to force international unionism over all industry. I believe in collective bargaining, but, in my opinion, the only successful collective bargaining system calls for complete representation of the workmen in a plant or in a particular branch of industry. No labor act that I know of in North America today suggests any such system; all are framed with the idea of forcing the men into one particular union, that union being the first one to enroll 51 percent of the employees of a company.

Labor legislation of this kind will not give industrial peace; in fact, in the few years since the Wagner Act was put in force in the United States, it has been amply demonstrated that a very large part of the labor unrest has been in connection with union jurisdiction. Though most of the labor acts are implicit and effective in controlling influence or intimidation by the management to guide a man in his choice of a union, and are most insistent that a man be allowed full freedom of choice as to whether he belong to a union or not, and which union he joins, they are so framed that they give the union powers which enable it to enforce a closed shop by insisting that the company must bargain with that union having 51 percent or more votes, and frequently going so far as to say that it is not intimidation for a company to make it a condition of employment that a man should join this particular union and that he should remain a member in good standing.

Such an act completely destroys the independence of the workman and turns the industry over to the union getting such an agreement as long as the act stays in force, because a company is debarred from hiring any man who does not take his orders from this particular union. The result of such an act will be either a closed shop or an unrepresented minority of workmen in the collective bargaining scheme. In the first place, the bargaining will be controlled by the head office of the union, which may have very little understanding of the local situation; and in the second place, a large minority may have no voice at all unless they join a union which they may not wish to join.

Labor Acts Cause Dissension

Practically all the labor acts which have been put into force in North America in the last four or five years are bound to create dissension between men and management rather than to create harmony and cooperation. It is true that they may in certain cases obtain concessions for the men. I believe, however, that greater concessions can be obtained by real collective bargaining. Collective bargaining can be had only when every man in an industry has a representative on the bargaining agency. Where there are unions in the plant, generally speaking, the union will succeed in electing more representatives than their members would justify. If two powerful unions are in a plant, unquestionably one of those unions would have the majority vote in a bargaining agency. Then you would get a condition very similar to that in the various



PROFIT SHARING was inaugurated at this Consolidated Smelting & Refining works 27 years ago. Equitable profit sharing is an important part of the good-labor-relations plan set forth by the author. He proposes paying (1) a fair living wage, (2) a fair return on capital invested, and (3) dividing the remainder in the ratio of yearly payroll to total money invested

Canadian parliaments, where you have a government and one or more oppositions. If only one faction—the one having 51 percent or more votes—were sole bargaining agent, it would be just as reasonable to argue that after a Dominion election all members of those parties who are not in the party holding the majority should go home and have no part in the government of the country. The fact that the opposition sits in Parliament and is entitled to express its views in the House most certainly tends to keep peace in the country. It has also been demonstrated in Parliament that the leading party in the government will vary from time to time as it holds or loses the confidence of the people it represents.

I believe that The Consolidated Mining & Smelting Company of Canada's Cooperative Committees have demonstrated that exactly the same conditions are suitable for industry. In our case, every department has elected a representative. No attempt has been made by the management to control these elections. No questions have been asked as to whether a man belonged to a trade union or not. These representatives have generally represented approximately one hundred workmen each. Our workmen have succeeded in obtaining more wages, more security of employment, and better conditions generally than obtain in any other company I know of in the Dominion of Canada. This has all been secured through the system of collective bargaining outlined in the foregoing, although the name given to it in the past was Workmen's Co-operative Committee instead of Workmen's Bargaining Committee.

Cooperative Committees Create Harmony

This system has the advantage that it tends to bring the workmen and the management into closer harmony, whereas the remote-control bargaining agencies will tend to put them further apart. To realize this, one has only to read or listen to the speeches of the international organizers, which consist almost entirely of abuse of management and industry, and frequently government, in connection with high profits, poor wages, poor conditions, and general profiteering, interspersed with high-sounding phrases that their only concern is to increase the war effort. If we are to have industrial peace and happiness it is essential to restore or create confidence between management and labor. It must be apparent to every one that capital and labor are and must continue to be partners, and that far more prosperity can be had by each side if these thoughts are kept uppermost in the minds of both management and labor. The beneficial results already obtained by many of the Joint Production Committees recently established at the suggestion of the Dominion government have proved conclusively that real partnership cooperation between labor and management is the solution of many of our problems.

While war contracts are on and subsidies are possible, wages can be set at approximately the same level throughout the country. When peace returns it will be absolutely essential that any industry which could be carried on and pay a living wage should be kept continually in operation through the period of reconstruction. As it is neither fair nor possible to ask a poor industry to pay the same wage that a prosperous undertaking can pay, it is most important that no fixing of wage scales will restrict operations; nor do I think it advisable to set a wage that takes no regard of the workman's ability and willingness to work. It is for these reasons that I think a sound and full collective bargaining scheme in each plant or industry should be the goal aimed at, rather than majority bargaining by a nation-wide agency.

It is very doubtful if the wave of labor legislation passing through the U.S.A. and Canada will give the results they were expected to by our legislatures. Many of these so-called collective bargaining acts are far from being collective bargaining. They are purely and simply acts granted to organized labor in answer to the demands of labor executives. A careful

analysis of these acts and their effects, I believe, indicates that they may not be in the best interests of the community as a whole, and perhaps not even of labor itself. They unquestionably tend to deprive a man of his personal liberty. They unquestionably tend to keep men and management apart. They almost invariably provide that a company must make an agreement with a body of men who have no legal responsibility, while the company is of course legally responsible for its acts.

If unions are to make agreements they should be obliged to conform to the laws the same way as any other companies which do business. Once a statute is put on the books, the government must see that it is enforced and must live up to it in its own undertakings.

Drafting Labor Legislation

Labor legislation should be drafted by a non-partisan non-political body. I would suggest an independent committee of labor, industry, and general citizens to study all labor relations, particularly the English, Swedish, and Norwegian, before drafting any labor laws.

It is most essential that labor and management be consulted on labor legislation, and, wherever possible, such legislation must be agreed to by both sides; also that the general public's case must be kept constantly in mind. It would be absolutely fatal to give labor executives power which could demand large increases in wages in wartime and, to gain their own ends, force strikes in industries which cannot be closed down due to war needs; or to give industry similar powers to curtail wages or any other perquisites of labor. Such powers have already shown direct inflation in the United States particularly, with ever-increasing demands.

Labor relations are probably the most important single thing in the welfare of a nation. They affect not only organized industrial labor but almost every class of citizen. Only a small part of the wage earners are organized into international unions, and the great majority are not organized at all, e.g., farmers; the men you hire to keep your garden and do your odd chores; small store shopkeepers and their clerks; office men and women; maids, cooks, etc. These classes constitute many times as many persons as the total of those who are organized. Also, those employees who are satisfied with their present employee-employer relations, cooperative committees, plant councils, or similar schemes, should have their rights respected.

It must always be remembered that whenever a concession on hours or wages, or on anything else that makes production cost more, is granted to one section, an equivalent amount must be taken from other sections of the population to pay for it.

No laws should be passed which might force a Canadian company to make its deal with foreigners, whether they be American, German, Russian, or others. Foreigners never will have Canadian interests at heart. True, they may be interested in expanding their sphere of influence and collection of dues. This, however, is not enough to justify passing legislation which may force a Canadian industry to deal with foreign executives, frequently of foreign-controlled organizations, and to pay tithes to these organizations. The present situation in the U.S.A. might well be taken as a Stop-Look-and-Listen sign before passing any offspring of the Wagner Act in Canada.

Profit-Sharing Desirable

I am convinced that some equitable profit-sharing scheme is one of the best solutions to our problem, but it calls for a drastic change in employer-employee relationship as generally in force today.

The conditions necessary to obtain high production are, generally, satisfaction among the workmen and, where possible, a financial interest beyond their regular pay. A workman should be assured of a living wage as a first charge on a company's earnings. This wage should be sufficient to allow his family to live in comfort, the standard of comfort being that usually enjoyed in the neighborhood. Naturally this wage will vary from time to time, and between one locality and another. If the workman is prepared to put in increased effort there should be some compensation for that increased effort, as a second charge against the earnings of the company.

The next charge must be a living wage for the money actually invested in the company, whether this money is secured by the sale of stock, bonds, or profits ploughed back into the industry, and could be defined as interest and sinking funds or other returns that would have to be paid to keep the industry in healthy existence. This amount will vary greatly in different industries, but I am inclined to think that in our own company it would be approximately 5 percent at the present time. This would have to be on the total money put into the business up to the time of the inauguration of the profit-sharing scheme, without regard to depreciation or depletion, or else the actual value of all the plants' properties and assets at that date. If the cost of future expansion were provided by way of ploughing back profits, it would not be necessary to change the proportion, as the workmen could be considered to have supplied their share of this additional cost.

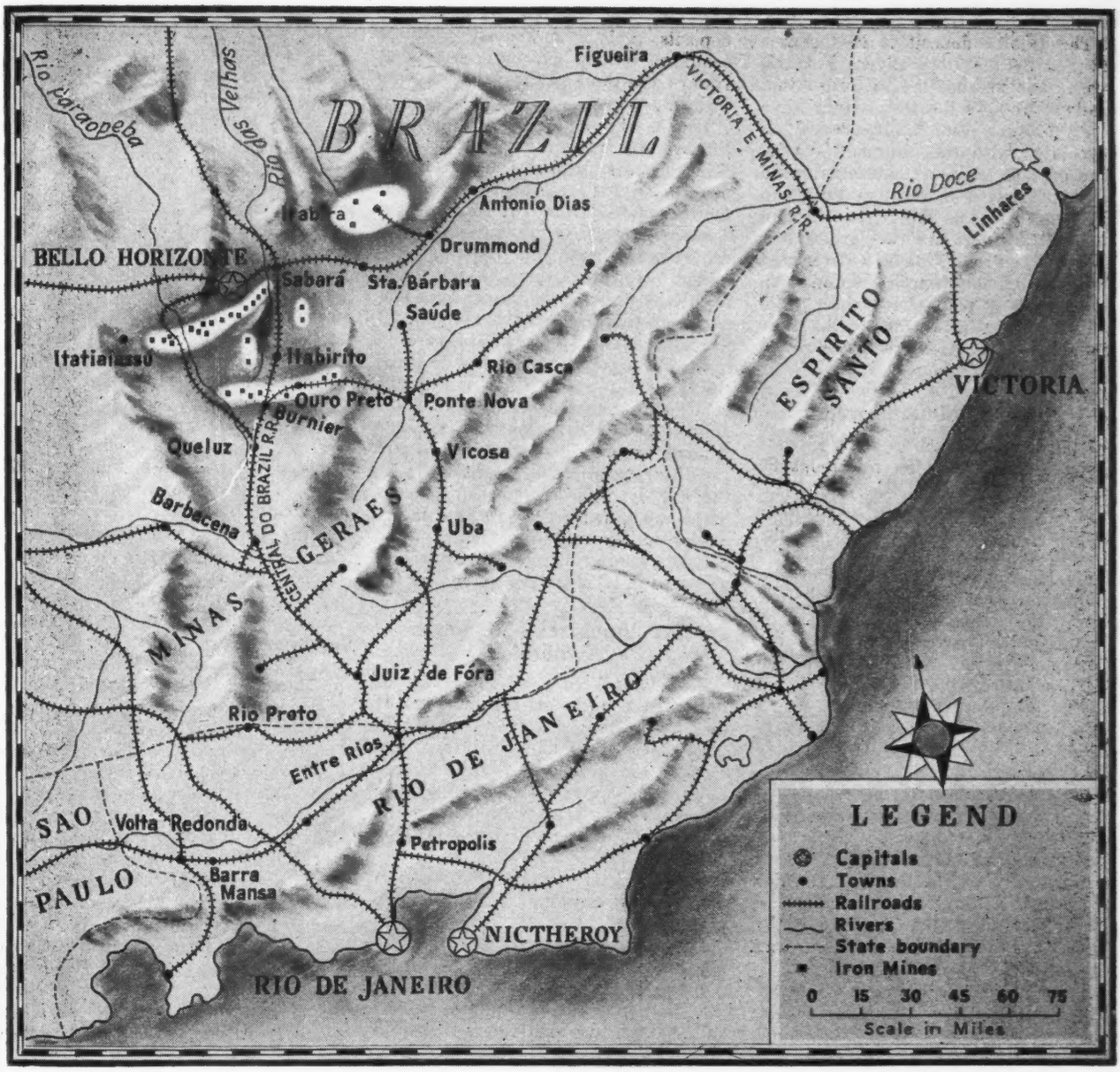
After the living wage of capital is taken care of, the remainder of the profit which is to be distributed should be divided in some agreed proportion between the working men and the shareholders. That proportion would of necessity vary with different industries, and, though it is dangerous to try to define it, in companies such as ours, where a very large investment has been made per man, I think that a year's payroll to the total number of dollars put into the property (no matter whether from the sale of stocks, bonds, or profits ploughed back into the business) should probably be about fair.

Such a scheme would have the advantage that the workmen would be partners with the owners, and that they could not sell or dispose of their interest. They would then to a certain extent be working for themselves. They would have a personal interest in the success of their company and would naturally be more happy in the performance of their duties and more interested in their work.

Our company inaugurated profit-sharing bonuses 27 years ago, and efficiency bonuses 21 years ago.

Consolidated 40-Year Record

I believe that our record of labor relations extending over more than 40 years, and the fact that no organization in Canada has been more ahead of the times in providing comfort, security, and prosperity for its workmen than our company has been for those in its employ, will show that our desire is to promote the general welfare of all concerned. It will take time and education to bring about the proper relationship between workmen and management. While this is being done, all our Labor Acts should be revised to provide for real collective bargaining rather than for union autocracy. The amending acts should be framed with the interests of the workmen, the industries, and the general public in view, rather than those of the union executives. Collective bargaining might be expanded to combine a specific industry and its workmen, as was suggested by the Whitley Commission in England towards the end of the first World War. We have never opposed our men—over eight thousand—joining any unions they wish to be connected with, and we have no objection to such unions being represented in a collective bargaining agency to the extent of the proportion of their membership; on the other hand, we have grave fears of depriving minorities of representation or of their rights to decide about joining any particular union.



Outlook for Iron from Brazil

Franklin G. Pardee, *Michigan Geological Survey, Lansing, Michigan*

THE MINERAL WEALTH of Brazil has been the subject of much discussion during the past few years on account of the need for raw materials caused by the war and because of the rapid depletion of our own high-grade reserves. Iron ore has been in such demand that all known resources of this material have been carefully studied and inventoried. Attention naturally has been directed to the rich iron-ore deposits of Brazil, especially those in the State of Minas Geraes. As this State contains one of the large undeveloped sources of iron ore of the world, it will be used in the future not only to supply the needs of Brazil but for export to other countries as well.

When the iron-ore resources of Minas Geraes are mentioned, those deposits which usually come to mind are the ones at Itabira do Campo, which, because of their spectacular nature, especially that of Caue Peak, have been described most often in both the technical literature and the writings of travelers. The United States government, through the Export-Import Bank, is supplying funds for the development of this area and the rehabilitation of the Victoria-Minas Railway over which this ore must move to the seaport at Victoria. However, the Itabira locality is only one of many rich iron-bearing areas in the State of Minas Geraes, and this article is written to emphasize the economic advantages of the deposits

available in the San Francisco Valley.

The Itabira deposit is in the area drained by the Doce River. For this reason and because the Victoria-Minas Railway follows the Doce River for a long distance, the Itabira deposit is associated with this drainage system. The area to which attention is called in this article is in the San Francisco drainage basin, as the Paraopeba and the Velhas rivers are two large tributaries of the San Francisco River that flow through this iron-ore region. An accompanying map shows these river valleys and indicates some of the more important deposits of iron ore found in this region.

Area of Mineralization

The principal iron-ore area extends along a range of hills for about 60 kilometers from the Pico de Bello Horizonte southwestward to Itatiaiassu. This range of hills is given several local names. From the Pico de Bello Horizonte, which lies about two kilometers south of the city of that name, the range for a distance of about eight kilometers is known as the Serra do Curral. Southwestward, the local names of the ranges are Serra da Mutuca, Serra da Jangada, Serra dos Tres Irmaos, Serra da Feicho do Funil, and Serra Mantiqueira. There are other local names, but the above will serve to identify these deposits. Extending southward from the Serra da Mutuca is an iron-bearing range called the Serra da Moeda. Another rich area is near the towns of Burnier and Ouro Preto, and the Pico da Itabirito, a short distance west of the town of Itabirito, also carries a large reserve of iron ore.

In the generally quoted estimate of iron-ore reserves in Minas Geraes, made by Luciano Jacques de Moraes, Octavio Barbosa, and Fernando Lacourt, the range from Bello Horizonte southwestward to Itatiaiassu is reported to carry 3.2 billion tons of iron ore. In an article in the Nov. 5, 1927, issue of *Engineering and Mining Journal*, Dr. Emilio Teixeira, a graduate of the University of Illinois and a geologist on the staff of the Brazilian Bureau of Mines, estimated 1.25 billion tons in the Serra do Curral portion of this range. In addition, Dr. Moraes and his associates have estimated 640 million tons in the Serra da Moeda, one billion tons from Burnier to Ouro Preto, and 320 million tons in the Pico da Itabirito. In the report on the National Steel Mill for Brazil the iron-ore reserves in the deposits in the Valley of Paraopeba and the Rio das Velhas, just mentioned, are set at approximately the same figures.

In the estimate by Dr. Moraes and his associates 15 billion tons are estimated for the iron-ore reserves of the State of Minas Geraes, of which a billion tons are assigned to the Itabira deposits. This is an indication of the comparative size of the reserves at Itabira and those in the San Francisco Valley.

Lack of extensive exploration throughout iron-mining districts of Minas Geraes precludes accurate estimate of any of these deposits, and the figures quoted from Dr. Moraes, Dr. Teixeira and from the National Steel report are general and probably optimistic. However, there is no doubt about the presence of tremendous tonnages of very rich iron ore and iron-bearing rocks. The hard iron ore in most of these deposits has resisted weathering to such an extent that the iron ore forms the backbones of the ridges and hills. With the large amount of ore shown on surface and the characteristic soil conditions near the ore deposits, more accurate estimates are possible from meager information in Minas Geraes than in those districts where test pits and drill holes are needed to show the extent of the ores.

Ore Analyses—Tonnages Available

There has been a singular lack of published reports on the analyses of the ore in these various deposits in Minas Geraes. In the estimate of Dr. Moraes and his associates the 15 billion tons of ore are divided as follows:

1½ billion tons are compact hematite carrying 65 percent or more metallic iron.

3½ billion tons are said to have an iron content ranging from 50 to 60 percent.

10 billion tons carry from 30 to 50 percent iron.

In the report referred to on the new steel mill of Brazil, the following average analyses are used for the reserves of the Paraopeba and Velhas river valleys.

	Percentage Composition			
Fe	P	SiO_2	Mn	Al_2O_3
Compact hematite				
66.00	0.05	1.30	0.20	0.30
Canga				
58.00	0.15	6.00	0.50	3.00
Itabirito				
62.00	0.10	5.00	0.50	2.50

The expression "Canga" is the Brazilian name for surface ore consisting of hard cobbles and fragments of hematite cemented within a matrix of limonite. It is usually higher in phosphorus than the compact hematite, due to contamination from the surface minerals that have penetrated the ore and the cement by both chemical and mechanical action. In many places the canga is decomposed sufficiently to be mined with pick and shovel. The hard fragments are usually shipped, leaving behind as much of the lower-grade cementing material as possible. The Itabirito type of iron ore is made up of various friable hematite, limonite, and quartz layers, and, as can be seen from the analyses, this type of ore runs a little higher in phosphorus and lower in iron than the hard hematite, but on account of its porous character it is very suitable for furnace use.

The few analyses that have been published showing the character of the ore of the San Francisco Valley have been sufficient to show that high-iron, low-phosphorus ore can be produced here, as it can from the Itabira deposits. The actual amounts of this premium ore can be determined only by thorough exploration and sampling. The fact that the tenor of this ore, as indicated in the report on the National Steel Mill, shows an average analysis of 66 percent Fe and 0.05 percent phosphorus indicates that there must be large tonnages that carry a negligible amount of phosphorus and are suitable for any steel-making process. An examination of many of these deposits in a manner similar to that done at the Lake Superior iron mines undoubtedly would show possibilities for selective mining to produce practically any grade of ore. The Casa de Pedra mine of the A. Thun Co., at Congonhas do Campo, is the only mine in the San Francisco Valley which is opened up to any extent, and individual analyses show that this ore could be graded both for iron and phosphorus to meet practically any furnace requirement.

At the other deposits in the San Francisco Valley, mining has been confined largely to the canga type of ore, and the representative analyses reported for these deposits have usually been obtained from shipments. On account of the surface material included with the ore sent out, it is probable that few of these analyses are representative of the deposit itself. In short, the San Francisco Valley iron-ore deposits are extremely large, and by application of ordinary iron-mining practice can be so mined that virtually any grade of iron ore can be produced.

Transportation Improvements Required

Exploitation of the iron ores of Minas Geraes has been delayed by the difficulties of transportation. The Itabira district is about 325 miles from the seaport of Victoria by way of the Victoria-Minas Railroad, and, until construction of the 27 mile branch connecting the railroad with the deposit, the ore had to be moved to the town of Drummond by trucks.

Victoria-Minas Railroad is of meter gage and was laid out to avoid heavy earth work and expensive bridges. The result was a very winding roadbed with some steep grades. The loan from the Export-Import Bank is to be used to improve the roadbed, replace some of the rails, and purchase new

rolling stock. At present locomotives use wood for fuel, but this will undoubtedly be changed to coal. Even with the improvements made, the unit cost of transporting ore over this distance will be high, due to the gage of the track, which will limit the size of the cars and the tonnage to be handled each trip.

The San Francisco Valley is served by the Central do Brazil Railroad, which is 1.6 meters gage (5 ft. 3 in.) from Rio de Janeiro to Bello Horizonte and has feeder lines, as shown by the map, of 1-meter gage. The map also shows how advantageously this broad-gage line is situated in relation to a large portion of the deposits of the San Francisco Valley. The distance from Rio de Janeiro to Bello Horizonte by way of broad-gage line is 390 miles, and to Congonhas do Campo is 300 miles. The average haul would be between these two figures.

Manganese mines in and around Lafaiete and Burnier have supplied a large tonnage of ore to the Central do Brazil Railroad for export for many years, and this railroad is therefore partly equipped to handle bulk ore tonnages. The Casa de Pedra iron mine has been a shipper for export for many years.

The new steel plant at Volta Redonda is on the broad-gage line of the Central railroad between Rio de Janeiro and Sao Paulo, and it is the intention to supply the furnaces at this new steel plant from the ores of San Francisco Valley. This new demand on the Central railroad will naturally call for improvements of the railroad to facilitate the ore movement. The addition of the ore needed by the new steel mill to the tonnage of manganese and iron ore moved over the Central railroad for export will give a volume of ore traffic on this railroad which should result in low unit cost of transportation. The region around Bello Horizonte is becoming one of the manufacturing areas of Brazil, and there will be a tremendous need for industrial coal and other supplies in this region. Agricultural resources of the region are rapidly being developed and all this will mean return traffic for the Central railroad.

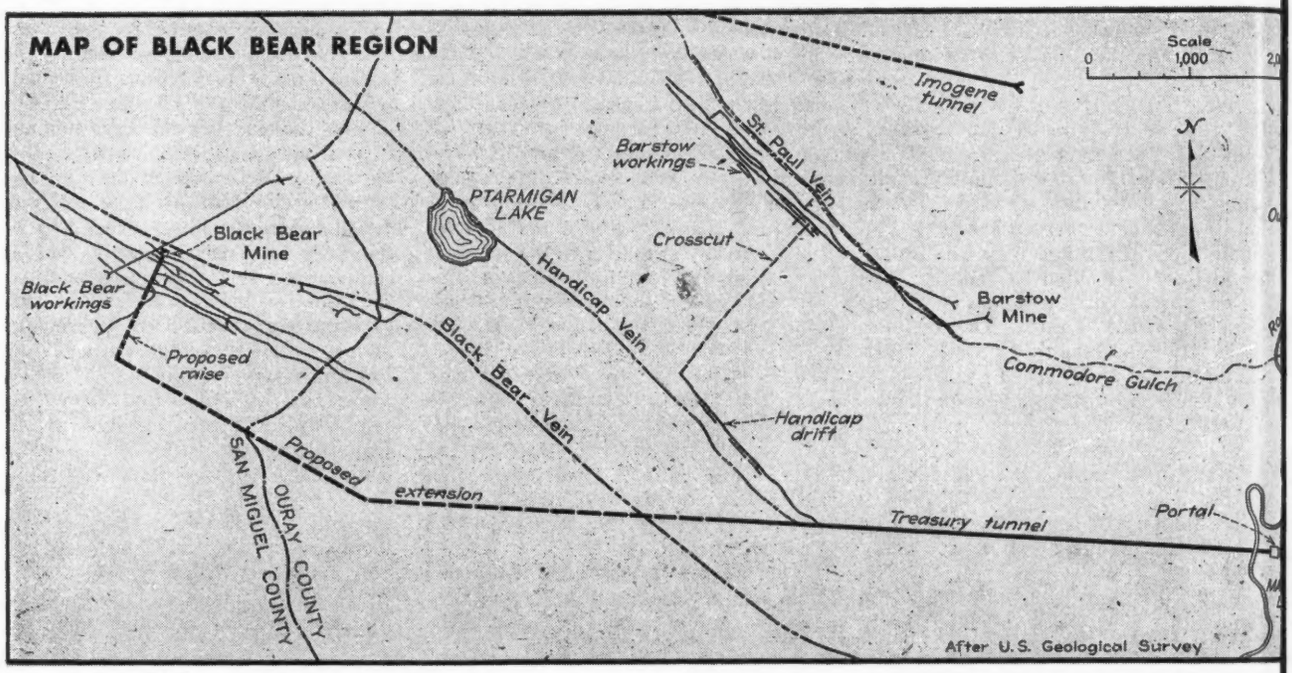
The iron ore tributary to the narrow-gage lines in the San Francisco Valley deposits would naturally have to be reloaded into larger cars for shipment to the new steel mill or to Rio de Janeiro for export. At present this transfer is done by hand and is expensive, but the construction of loading bins for the transfer of the ore from the narrow-gage to the broad-gage line would not be difficult.

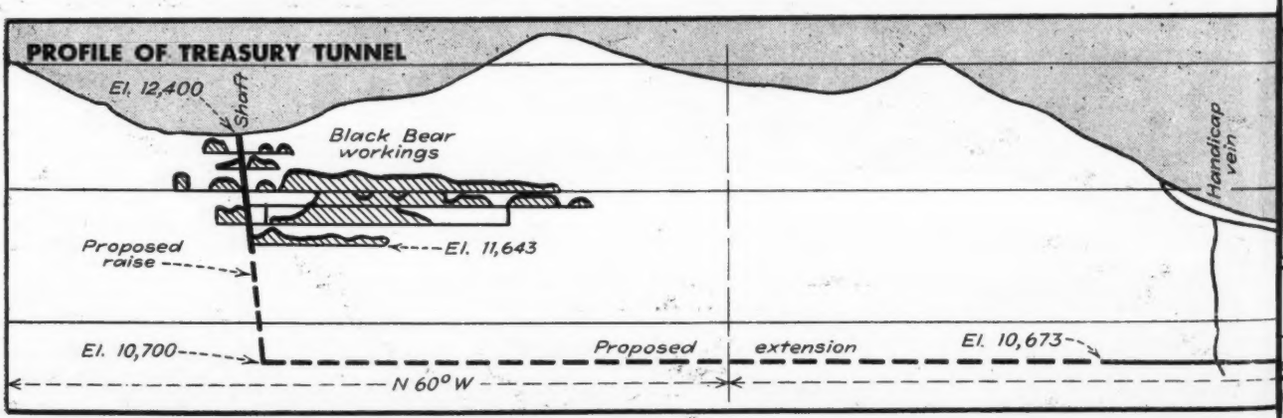
The port at Rio de Janeiro, which is noted for its size and facilities, may become the entrance for large tonnages of coal needed to supplement Brazil's high-ash coal for use in the new steel mill. Development of large scale, efficient coal-unloading machinery at the port has been planned, and accompanying this will undoubtedly be facilities for the loading of the bulk-carrying ships with iron and manganese ore for the return voyages. The iron ore reserves of the San Francisco Valley are so large that Brazil can safely export large tonnages without jeopardizing the future demands for iron ore for her own industries. Low-cost mining plus accurate grading and efficient, economical transportation should make the iron deposits of this San Francisco Valley a great asset to Brazil and a source of high-grade ore for the furnaces of other countries.

Photo by Boury from Three Lions

BRAZIL'S STEEL INDUSTRY may soon become a vital part of her economic life under the impetus of increasing domestic demand for steel products. Center of Brazil's production is Volta Redonda, where the steel mill shown above is located

Treasury Tunnel Extension

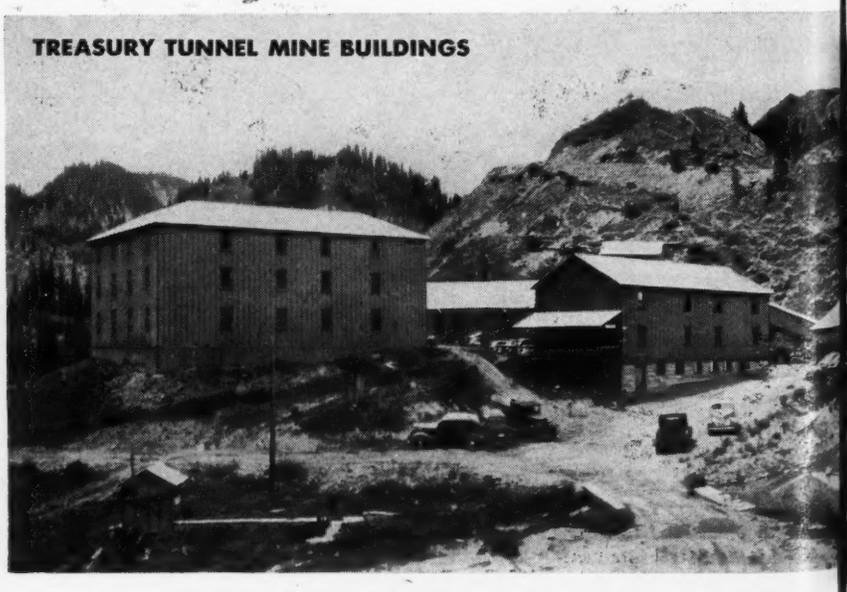




MAP of Treasury Tunnel-Black Bear area near Ouray, Colo., showing related mine workings

PROFILE of tunnel indicates new route to Black Bear mine's ore through proposed extension

PANORAMA of buildings at the portal of the Treasury Tunnel. From left to right: bunkhouse, boarding house, compressor house, primary crushing plant, fan house, blacksmith shop. Portal is behind fan house, mill is behind boarding house. Black Bear ore will be hauled here via tunnel for treatment in the Idarado Mining Co. mill

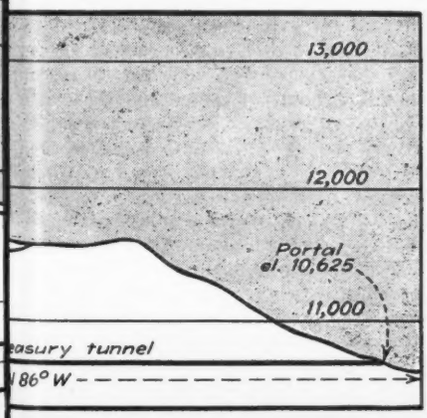


Tap Black Bear Zinc

ONE OF THE MOST SIGNIFICANT recent developments in Colorado mining is the leasing of the property of the Idarado Mining Co., in the San Juan region of Colorado, by Metals Reserve Co. in order to reopen the Black Bear mine, near Telluride, through the Treasury tunnel. Besides furnishing additional zinc for war purposes, this development is likely to add another peacetime producer to the list of important Colorado mines.

The Black Bear mine is on the western slope of the La Plata Mountains at an elevation of 12,400 ft. in the Ingraham Basin, which also contains the famous Tomboy and Smuggler-Union mines. The portal of the Treasury tunnel is on the eastern slope of the mountain at an elevation of 10,625 ft., and it is planned to connect the two, so that the Black Bear's reserves of 44,000,000 lb. of zinc, 24,400,000 lb. of lead, and 9,200,000 lb. of copper can be mined and brought out through the tunnel at the more convenient elevation.

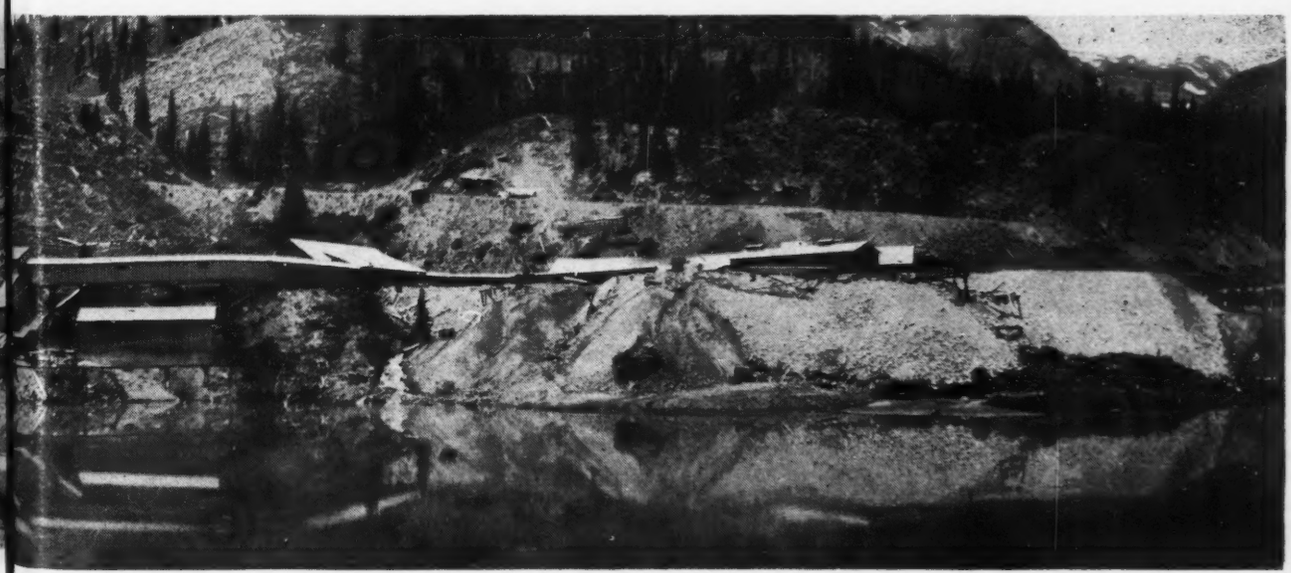
TUNNEL DRIVERS are, left to right: "Long John" Austin, manager of tunnel operations; Louis A. Stiles, tunnel superintendent; John Edgar, manager for Sunshine Mining Co.



First located by some Finnish miners from the Iron Country, the Black Bear mine has had a checkered career. For years it was a consistent producer of both precious and base metals, but with the decline in silver prices, it came upon evil days. Harry Payne Whitney acquired the Black Bear finally at a sheriff's sale in 1912, and, largely because of the clever management of Whitney's superintendent, Bulkeley Wells, the mine once again gained prominence, even exceeding its former production.

In 1926, however, a snowslide wrecked the mine's surface buildings, and operations were never resumed. Ownership passed to the Whitney estate, then to some Portland, Ore., investors, then on to the Idarado Mining Co.

When the Black Bear property was shut down in the twenties it was known to have 300 000 tons of ore blocked out and ready for mining, estimated to average 5 percent zinc, 1.9 percent lead, and 0.9 percent copper, with substantial gold and silver values. The south-dipping vein averaged 5 ft. to 6 ft. in thickness and was as thick as 15 ft. in places. Up to the developed depth of 757 ft. the vein showed no sign of diminishing grade or thickness;



thus, a considerable reserve beyond that developed may exist.

In addition to providing drainage of the Black Bear property to a depth of 943 ft. below the bottom of the old workings, the extended Treasury tunnel will afford a much more convenient site for hoisting and milling operations than the surface near the Black Bear workings. The collar of the old shaft is in rugged, inaccessible country, much affected by snowslides in winter. The Treasury tunnel portal is along the "million dollar highway" between Ouray and Silverton, where its lower elevation and more sheltered position make it accessible throughout the year. To connect with the Black Bear, now partially filled with water, the Treasury tunnel, already 5,539 ft. long, will be extended 6,200 to 6,300 ft., and a raise approximately 950 ft. in height will be driven. It is hoped that much of this development will be in ore-bearing ground.

The operation is being conducted by the Sunshine Mining Co., of Yakima, Wash., as agents for Metals Reserve Co. John Edgar, chief engineer for the Sunshine Co., is in local charge of the property. The tunnel and raise work is being done under contract by Stiers Bros. Construction Co. of St. Louis, Mo., being managed by "Long John" Austin, famed for many exploits in tunnel driving, including the record-breaking Carlton tunnel, at Cripple Creek.

The holdings under lease are the property of the Idarado Mining Co., a consolidation of four older properties; the Treasury tunnel, the Black Bear mine, the Barstow mine, and the Imogene mine, all of which, except the Imogene, have operating histories dating back beyond the turn of the century. The Idarado company, formed in 1939, is owned by Colorado interests, the Sunshine Mining Co., the Newmont Mining Corp., and the Callagan Zinc-Lead Co. Oscar Johnson, president of the Mine & Smelter Supply Co., Denver, is president. The property is leased to Metals Reserve for a period of five years.

Prior to leasing of the Idarado holdings by Metals Reserve, an investigation of the project was made by the U. S. Bureau of Mines under the supervision of L. K. Jacobsen, district engineer for Colorado. A favorable report by the Bureau facilitated conclusion of the transaction between Idarado and Metals Reserve.

The only one of the four properties consolidated into this enterprise which has had important operations in recent years is the Treasury tunnel. In 1937 this property, which had been shut down since 1916, was acquired by the San Juan Metals Corp., headed by Frank Eichelberger. This organization built the 300-ton flotation mill now on the property and did drifting and stoping on the Handicap vein. Driving of a crosscut to the Barstow workings from the Handicap drift was also started. However, operations were shut down before the crosscut was finished.

NOT THE LEAST of the difficulties faced by John Austin and his crew of drillers is the ice-box atmosphere of the Treasury Tunnel's interior. Water issues from the rock at 37 deg. F., and working in the tunnel is like being put into cold storage. Electric stoves have been set up near the working face to keep the men as warm as possible, but the ice-cold water still makes it tough. We wonder if there are any old Comstock or Butte miners among the crew.

John Austin will be remembered for his work on the 32,000-ft. Carlton tunnel, driven to drain the Cripple Creek mines. Work on this 10 by 11-ft. bore began on July 13, 1939, and though the original estimate allowed four years for its completion, the tunnel was finished on July 23, 1941. During the progress of the work, Austin's three crews of drillers set a record for tunnel driving, turning out 1,787 ft. of advance in one month. Their daily average that month was 57.7 ft.

The old tunnel was driven with a 7x8-ft. cross-section, and has a grade varying from ½ to 2½ percent. The steeper parts of this grade are troublesome for haulage, as they make cars difficult to hold back when loaded and harder to pull upgrade. The present extension is being driven 9x9 ft. with a ½ percent grade.

Drilling is being done with a four-drill drill carriage, with Ingersoll-Rand drilling equipment used throughout. Jackbits are employed, the complete blacksmith shop being equipped for hot-milling. A typical round consists of 32 9-ft. holes, starting at 1⅞-in. diameter and finishing at 1¼-in. With full crews, average drilling time has been 1 hour and 40 minutes; loading and blasting time, 30 minutes; exhaust time, 15 minutes; and mucking time, 1 hour and 10 minutes. Illinois Powder Co. Gold Medal Brand 60 percent gelatin is used in blasting.

During loading, blasting, and mucking operations, the drill carriage is stored at a side track at the end of the old tunnel, where there is also a layby switch. A similar installation will be made about 3,000 ft. from the end of the old tunnel, when the new work has advanced that far. Cherry-picker holes are cut every 200 ft. The hoist used for transferring cars by the cherry picker is a 12x12-in. shop-made air unit. Mucking is done with an Eimco No. 21 loader. Card 91-cu.ft. Granby-type cars are used.

Trackage is of 24-in. gage, standard tracks being 30 ft. long. Near the face 6-ft. lengths are used, welded to channel-iron ties. At the face slide rails are employed, consisting of lengths of 3-in. angle iron welded together to give a U-shaped cross-section. These slide rails slip over the ordinary track, and can be quickly adjusted so that mucker or drill carriage can be advanced right up to the face.

Haulage equipment consists of one 8-ton Goodman electric locomotive, two Atlas 5-ton battery locomotives, and one 8-ton diesel locomotive using a 66-hp. 4-cyl. International engine mounted on a Plymouth chassis. The smaller units are used for tramming near the face.

Air is delivered to the face at 125-lb. pressure through a 6-in. pipe-line. A 2-in. water line is used. Ventilation is provided by a Root-Connersville blower delivering 7,000 cu.ft. per minute through an 18-in. sheet-iron pipe. The pipe is equipped with several low-pressure relief valves to prevent its collapse in case of a stoppage when being used for suction. To protect the pipe from flying rocks during blasting a conical pyramid-shaped shield is placed over the end, the shield being connected to the pipe by a cage of ¾-in. bars which allows air to enter or escape. Despite the abundant ventilation, the tunnel is extraordinarily cold, the rock temperature being 37 deg., even though the present face is under approximately 2,000 ft. of cover.

The compressor plant consists of: one Ingersoll-Rand P-R-E-2 compressor with 14x16-in. and 24x16-in. cylinders, direct-connected to a 250-hp. General Electric motor; one Ingersoll-Rand Imperial 10-B compressor with 18x14-in. and 10x14-in. cylinders, connected to a 150-hp. General Electric motor by a flat-belt drive; and one Gardner-Denver model WGB 4002 vertical compressor, with 7x5-in. and 5¾ x5-in. cylinders, connected by V-belts to a 60-hp. Fairbanks-Morse motor.

The drilling crew consists of eight men on the drill carriage, one of which acts both as driller and shift boss, plus one "nipper" to handle bits and steel. The rest of the underground crew consists of one mucker operator, five track men, one powder man, and the locomotive operators. A bonus system is employed, the crew getting a bonus for footage per shift exceeding 10 feet.

New Ball Mill Support Reduces Bearing Friction

S. Kock-Petersen, *F. L. Smidth & Co., New York, N. Y.*

CONVENTIONAL methods of ball and tube mill support, involving some combination of trunnion bearings and tire-and-roller suspension, are eliminated in a new design incorporating slide shoe bearings which was developed and patented by Michael Treshow, development engineer of F. L. Smidth & Co., New York, N. Y. The new support was designed specifically for long multi-compartment mills to reduce bearing friction, to avoid danger of shell, head, or trunnion breakage caused by large bending moments, and to improve feed and discharge arrangements. Mills requiring as much as 1600 hp. to drive them have been equipped with slide shoe bearings, and have operated successfully for years, but only recently have the bearings been applied to smaller ball mills of all types. Because of the interest they have aroused, the following short description of slide shoe bearings is offered.

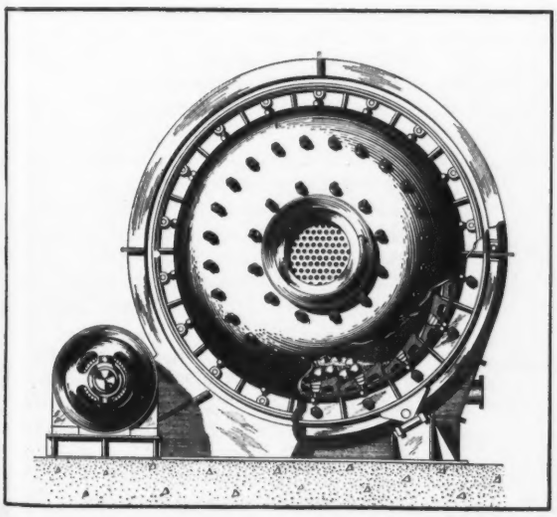
Essentials of the bearing are a flat tire or slide ring of cast steel or welded construction installed around the mill body, and two slide shoes placed symmetrically under the tire and resting in self-aligning supports. Arrangement of these elements is shown in the accompanying drawings. In those showing the complete mill, the slide ring is mounted in the center of the mill next to the ring gear. A narrow flange between gear and slide ring rides in guides on each side of the mill and insures longitudinal alignment.

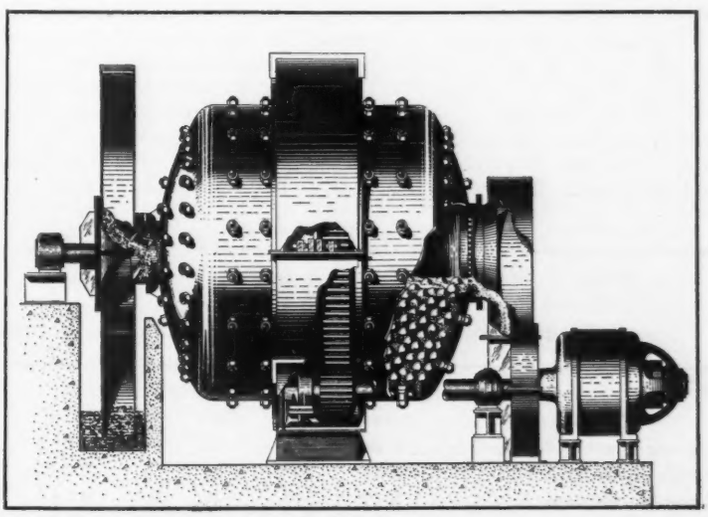
Slide shoes are usually lined with babbitt or a fine grade of cast iron. They are mounted on self-aligning supports in order to distribute the load over all shoes evenly and to make the bearings self-lubricating. In operation a continuous wedge-shaped oil film is maintained between the sliding ring and the shoes. The shoes are pivoted in such a manner that the lubricating oil film will become as heavy as possible and actual tests have shown how the most favorable conditions with a minimum of friction loss can be obtained for a heavy oil film.

It will be realized that for these bearings, the measure for a factor of safety is not merely a matter of how great a pressure is applied per sq. in. of bearing surface, but is in reality a matter of how heavy an oil film separates the slide shoes from the sliding surface of the mill. In other words, how far apart are the two metallic surfaces when the mill revolves? Research work has proven that the thickness of the oil film depends upon the following factors: 1, properly designed, balanced supports of the slide shoes; 2, velocity of the slide ring relative to the shoes; 3, proper dimensions of the slide shoes; 4, viscosity and quality of the lubricating oil.

In this connection it is of particular interest to consider the influence of the peripheral velocity of the slide ring. In a slide shoe bearing the oil film will gain in thickness if the speed of the sliding ring is increased. This can be compared with the fact that the carrying capacity of a "surf board", or for instance, an airplane, increases with a greater speed. In the case of a mill which runs a definite number of revolutions per minute, the peripheral speed can only be increased by using a large diameter, and the sliding ring is more favorable the larger its diameter. Therefore the slide shoe system is superior to that of the usual trunnion bearing because of its larger diameter and greater velocity. These bearings are, therefore, always running on an extra thick oil film, and the mill will float on this oil without any metallic contact. Thus the frictional power consumption of the mill has been practically eliminated.

When a mill of this type is shut down for a certain length of time the oil film will quite naturally be squeezed out, and the mill will gradually settle down on the metallic surface of the shoes. Therefore, in or-





SLIDE SHOE BEARINGS are installed as shown in the sectional end view at left of a mill so equipped. Bearing at lower right of mill periphery is duplicated on left. The right-hand view shows how the mill rides on a smooth tire at left of the ring gear

der to start the mill, the shoes are equipped with a small oil connection leading to the pivot point of their sliding surface. This pipe is connected to a small high pressure oil pump which is operated a few strokes before or while the mill motor is being started. The pump is either hand operated or driven by a small electric motor. It forces enough oil in on the slide shoes to separate them from direct contact, and the mill starts with little or no friction. In fact, a large heavy mill body (without the ball load) can be turned over by hand by one man turning the coupling on the speed reducer after the mill has been brought to float on this pressure oil film. This has been found true even where the weight of the mill was 150,000 lbs. or more.

The experience gained from the construction and operation of the large compartment mills, has now been utilized in a new design of smaller mills, particularly ball mills, to which the slide shoe bearing principle has been applied.

The accompanying drawings show two ball mills of the new design. One is applied for wet grinding and one for dry grinding. The general principle in the design of these smaller mills has been to concentrate the entire load of the mill on one slide shoe bearing placed approximately at the middle of the shell. Due to the fact that the entire mill is supported by the slide shoe bearing it has been possible to make both mill ends free, and the diameters of both inlet and outlet ends can be designed to any practical size desired.

This advantage in mill design is especially of interest where ball mills are used in closed circuit grinding and where mills with large diameters have to be used with a large circulating load. With the ever increasing demand for larger circulating loads, and uninterrupted performance, a mill of this design should become an interesting addition to the long range of mills used in the grinding process.

German Metallurgy in Wartime

W. J. Kroll, *Consulting Metallurgist, Niagara Falls, N. Y.*

PART II

Part I appeared in the September issue on page 50.

PERHAPS THE MOST INTERESTING and most difficult task of German metallurgists working with tin processes is in the treatment of the residues of bell metal smelting processes discussed in last month's article. These materials consisted of liquation residues, or "saigerdoerner", tin and bronze anode slimes, and various kinds of blast furnace and reduction furnace dusts. The main problem was the treatment of the "glanzmetall" alloys derived from reclaiming bearing metals. Composition of these various residues is shown in the accompanying table.

The glanzmetall came from the so-called Meyer process, in which a deep kettle-like reverberatory furnace is used. It is brick-lined and heated internally with oil burners, and batches of 50 tons are treated in it. Scrap bearing metal is melted down at 800 deg. C., then cooled slowly to about 185 deg. C., whereupon a ternary eutectic containing 3.5 percent antimony, 58 percent tin, and 38.5 percent lead is tapped off. The remaining crust, which is remelted and tapped, is the glanzmetall referred to above. The ternery eutectic is used in solder and for bearing alloys.

The first step in processing tin and bronze electrolysis slimes was to roast them to remove sulphur and sulphuric acid.

Recovery of the noble metals contained in these products was the main incentive for employing the rather complicated process described below. Attempts to separate silver from lead-tin alloys with zinc (Parkes) failed. In the liquation of such alloys, silver distributes into the residue and the fusible part. Copper, which was always present, interfered with any kind of silver separation: Systematic freezing of the eutectic (Pattinson) was quite as unsuccessful.

The process to be used should provide a separation of the noble metals and copper, at least, from tin. This was done by reducing the mixed oxides in a reverberatory or blast furnace, blowing down the metal in a converter where noble metals remain behind in an alloy with copper and antimony, while the oxides of lead and antimony are caught in a baghouse. A high antimony slag was produced which had to be recycled. The converter copper, high in noble metal and antimony, went to a sulphate electrolysis, while the oxides were separately reduced in a reverberatory furnace to a metal which was either electrolyzed in a sulpho-stannate bath, if it contained more than 80 percent tin, or was sold for solder or bearing alloy. The tin electrolysis in sulpho-stannate at 90 deg. C. presented no special difficulties as long as the anodes contained more than 80 percent tin.

The iron rich "saigerdoerner" were used either as small additions to the reverberatory furnace as a slag-forming agent, or were directly bessemerized, forming an iron-rich slag easily taken by the blast furnace. It is known that a silicon liquation treatment of such materials has been used elsewhere for iron-tin alloy separations.

Processing of tin anode slimes, running sometimes as high as 2.5 percent silved and 25 percent antimony, presented no difficulty except for silver losses in the flue dust and a reduced converter life, which with tin-rich materials was about 50 batches. The converter copper, high in silver and antimony, had to be diluted with additional copper to bring silver below 1

Table No. 1

Approximate Composition of Tin Materials Treated

	Analysis Percent						
	Sn	Sb	Cu	Pb	Ag	Fe	S
Tin anode slimes (roasted)	10-30	5-25	5-15	10-20	0.5-2.5	0	0.5-5
Bronze electrolysis slimes	45-65	1-5	10-20	0	0.2-1.0	0	0.5-2
Liquation residues	50-60	5-15	5-20	5-10	0.2-0.5	20-40	0
Blast furnace dust	5-15	5-10	1-5	5-10	0.2	0	0.5-2
Glanzmetall	20-40	10-30	5-15	5-15	0.5-1	5-10	0

percent and antimony below 12 percent so that subsequent electrolysis might proceed. Layer formation was observed at the anode in the form of golden nickel antimonide crystals, and if more than 12 percent antimony was present in the anode, the layer became impervious to the current. Electrolysis slimes produced were sold to lead plants.

Reduction of the sulphur-bearing slimes in a reverberatory heated with gas caused great difficulty in the bag house because of formation of SO_3. Ammonia gas was added to the gas current every three hours to neutralize the small amount of sulphuric acid condensed on the wool. The life of the bag house was increased in this way from one day to six months, but the wool eventually became less pervious because of ammonium sulphate deposition.

The converter process permits a separation of the constituents of mixed tin materials into a lead-tin flue dust low in antimony; a converter metal, copper-antimony, with less than one percent tin, containing about three-fourths of the silver and all of the gold; and an iron-copper-antimony slag to be re-processed. The total recovery of tin from the residues through the whole process may reach 85 to 90 percent, depending on the tin content of the raw material.

Some other improvements of tin metallurgy may be discussed. Separation of antimony and arsenic from solder is performed in some German plants. Aluminum, the main agent, is stirred into the bath at 650 deg. C. while some inert agents may be added to make a loose dry scum. Only traces of aluminum remain in the solder. The scum presents grave health hazards, for if sprayed with water at room temperatures, it will release AsH_3, and storing in closed rooms presents the same danger. The scum should be dead-roasted on the spot, directly after tapping the tin alloy.

Sodium is an excellent agent for removing antimony and arsenic from raw tin at low temperatures. A liquid layer of sodium-arsenide-antimonide is formed which can be spooned off and burned with superheated steam. Analogously, hard antimonial lead and copper-antimony can be purified. The hazard to health is the chief reason for non-employment of this method in more plants.

Calcium and magnesium were used to remove traces of antimony from tin by adding one of these metals and liquating the alloy. The separation of lead from tin in solder was practiced by Goldschmidt.[1] Lead, having a higher affinity for chlorine than tin, can be eliminated with $SnCl_2$. Excess $SnCl_2$ can be eliminated from the $PbCl_2$ by using chlorine to form the volatile $SnCl_4$.

Calcium-Bearing Alloys

Born at the end of the first World War, calcium-hardened lead bearing alloys survived peacetime and are now used on a basis of perhaps 5,000 tons per year in German railroads as *bahnmetall*. While in this country preference was given fusion electrolysis in making such alloys, the two processes used in Europe are both chemical. In the first, which we may call the chloride process, $CaCl_2$ is reacted with sodium lead in an equilibrium reaction. In the second, which we will call the carbide process, CaC_2 is decomposed with lead, making Pb_3Ca with graphite liberation.

Industrial practice is as follows: $CaCl_2$ (90-95 percent), free from arsenic and phosphorus, is melted with a little NaCl in a 15-ton steel kettle. Lead is poured into the melt. At about 750 deg. C., clean dry sodium is stuck through the salt into the lead in 2-lb. lumps, which, stuck onto an iron pin, are pushed into the bath through a hole in a protective cover over the kettle. A 10-ton batch is cast every 12 hours.

Efficiency of the reaction, based on the sodium exchanged for calcium and that which was left behind in the alloy, was about 75 percent. Losses are due to parasitic reactions with oxide on the sodium lumps and through interference of moisture of the air. The finished alloy is kept sealed from air by a dry sand cover. For making a 3 percent calcium, 0.25 percent sodium alloy, about 8 lb. of $CaCl_2$ are needed per lb. of calcium produced. The raw material cost, based on a price of 12c. per lb. for sodium and 3c. per lb. for $CaCl_2$, amounts to about 45c. per lb. of calcium in the alloy. Kettle maintenance is an important supplementary cost item. Calcium metal sells at $1.00 per lb. in carrots, and about 20 percent is lost because of parasitic reactions when alloying calcium carrots with lead.[2]

The carbide process, which is much cheaper, is being practiced in this country, and no commentary will therefore be given.[3] German practice is to stir CaC_2 grains into the molten lead at about 750 deg. C. under a cover of calcium chloride and fluoride. Efficiency is 50 percent with the higher grade CaC_2, and alloys as high as 5 percent calcium are made within six hours.

Vanadium From Minette Ores

Germany is said to be self-sufficient with regard to vanadium, which she obtains from the minette ores of France and Luxembourg. These ores contain 0.07 percent vanadium and yield a pig-iron containing 0.10 to 0.15 percent. Vanadium may be separated from pig iron either by standing, whereupon the sulphate liquates out,[4] or by oxidation. The second method is the only one used widely.

Various aspects of producing vanadium by bessemerizing have been discussed by A. Harr,[5] H. Zieler,[6] Thyssen,[7] and Körber.[8] Oxidation of vanadium by FeO takes place in the presence of acid slags only after most of the manganese and silicon are eliminated; but in basic slags, vanadium burns out ahead of these elements. The back resistance of carbon on V_2O_3 may be reduced by adding stiffening agents to the slag.

Chemical processes for reclaiming vanadium from the enriched slags involve either chlorination or oxidation in the presence of a strong base. Vanadium recovery from minette ore reaches 50 to 60 percent of the vanadium content. Besides recovering large quantities of vanadium by these methods, Germany imports vanadium slags, containing about 10 percent, from the Spigerwerk in Norway, where the Seth process of bessemerizing is in operation on vanadium-titanium magnetites. Recovery of vanadium from red mud from the Bayer process has also been considered. About 300,000 tons of these muds containing titanium, chromium, and vanadium were available in 1942,[9] and they may be in use by this time.

Nickel

Following the same idea, the separation of nickel from iron was put into practice by Krupp. The German Frankenstein ores contain about 1 percent nickel associated with iron. After reducing these ores to a ferronickel of about 10 percent nickel, the iron is bessemerized out to a 40 percent nickel alloy, at which point some nickel starts slagging. Iron slag is used as blast furnace feed.

Bessemerizing may be continued to form nickel-bearing slags, to be separately reduced to a low-grade ferronickel slag, and a high grade ferronickel metal. This process is now in operation. Converter durability is probably low.

Zinc

In the last war, one plant produced zinc by fractional distillation of raw zinc in Faber du Faur retort ovens. The metal was tentatively used in electric cables but as a consequence of temporary heating, the metal was brittle. Spandau zinc alloy which already contained the main constituents of the Mazag alloys (copper and aluminum) was widely used in fuses, but mechanical results were erratic.

Germany is greatly indebted to this country for knowledge of methods of producing high-purity zinc and using it in Mazag alloys. These alloys in-

(*Continued on page* 104)

How to Make an Automatic Montejus

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University of California
Berkeley, Calif.

UNLESS YOU ALREADY KNOW, you are probably thinking about now, "What on earth is a montejus?" To be brief, it is a device for elevating liquids by means of compressed air. A direct displacement pump, or direct pressure pump, in other words. This article will tell you how the apparatus works and how to make it.

The word itself is derived from the French, *monter,* to bring, and *jus,* meaning juice, a juice-bringer, in short. The device includes a tank, so placed that it may easily be filled with the liquid to be pumped, and valves, so arranged that compressed air or steam can be admitted to the liquid surface, forcing the liquid out through a discharge pipe in the tank bottom.

Because there is no differential action, the height to which the liquid can be raised depends on its density and the pressure available. Within its working range, the montejus improves on the direct-acting reciprocating pump in having no working parts, other than the valves, and in suffering lower clearance losses and water leakage. It requires less steel than a pump of equal capacity, and the air cycle is the same if the air is not used expansively.

Devises for obtaining automatic operation of a montejus usually entail a float in the tank, which actuates the valves but often renders the device expensive and difficult to repair. The automatic montejus described below has been simplified so that it may be constructed from materials to be found on the scrap pile at almost any mine or mill.

Tank

The tank can be of any sort that will withstand the pressure. For a small pump, the 16-gal. tank (12 by 48 in.) used for water feed to rock drills may be used. A hole is cut near the bottom, and a 2-in. nipple welded on for connection of column pipe and one of the intake check valves, as shown in Fig. 1. The rate of filling depends on the intake head and size of intake check. Head on the intake check may be obtained by submerging the tank, or piping water into the check under a hydrostatic head. The experimental work was preformed on a submerged tank.

Air-Valve Mechanism

The timing mechanism and the valve for injecting compressed air are mounted on a small stand placed beside the sump and connected to the tank by hoses. The principle of operation is shown in plan and elevation in Fig. 2. In this figure, *A* is a three-way air valve, which in one position connects the air line to the tank, and in the other position connects the tank with the atmosphere.

B is a single-port water valve that admits water to the bucket, *E,* from the tee in the column pipe (Fig. 1) when air is entering the tank. These two valves are connected by shaft *G,* which turns in the bearings shown, but which is connected rigidly to beam *H.* On one end of the beam is timing bucket, *E,* with a valve in the bottom, and on the other end of the beam is a tin can in which weights can be placed. The magnitude of movement of the beam is controlled by stops, *K,* consisting of pieces of hose nailed to the stand.

When compressed air is being admitted to the tank, the weight can is down and the bucket up. To start the pump operating, the bucket is held down, and the compressed air turned on. The tank is connected to the atmosphere so water enters the intake check and fills the tank. When the tank is full, the bucket is released and the weight can goes down, admitting compressed air to the tank and opening water valve, *B,* which allows a little water to flow from the tee in the column pipe (Fig. 1) into the bucket. As soon as enough water enters the bucket to overbalance the weight can, the bucket goes down, shutting off the compressed air, the water to the bucket, and connecting the tank to atmosphere.

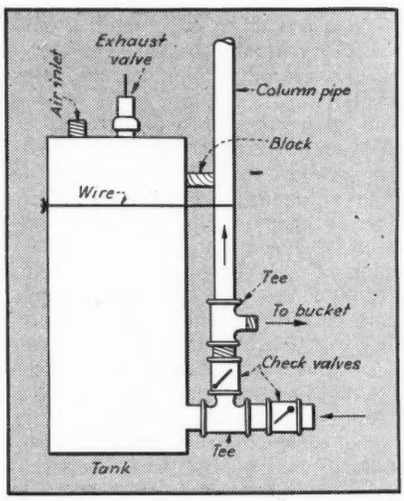


Fig. 1 . . . Valve and piping arrangement for tank of montejus. Water enters by gravity at intake, is forced by air pressure out through column pipe

The rate of flow of bypass water to bucket is controlled by valve *D,* which is adjusted so that the bucket goes down when all the water has been expelled from the tank. The tank now starts to fill, and at the same time water is leaking out of the bucket through a hole adjusted to empty the bucket at the time the tank is full. The weight can will now go down, and a new cycle starts.

Auxiliary Discharge Valve

The hose and the air valve offer so much resistance to exhaust of air that, if they are the only outlet, the tank would fill slowly. An auxiliary exhaust valve made from a vertical check is shown in Fig. 3, in the open position. The spring can be adjusted so that the valve opens at any desired pressure. As soon as the air valve, *A,* (Fig. 2) releases the compressed air from the tank, this auxiliary valve pops open. This auxiliary valve must close when compressed air is turned on, so it should be connected to a pipe in the top of the tank, which

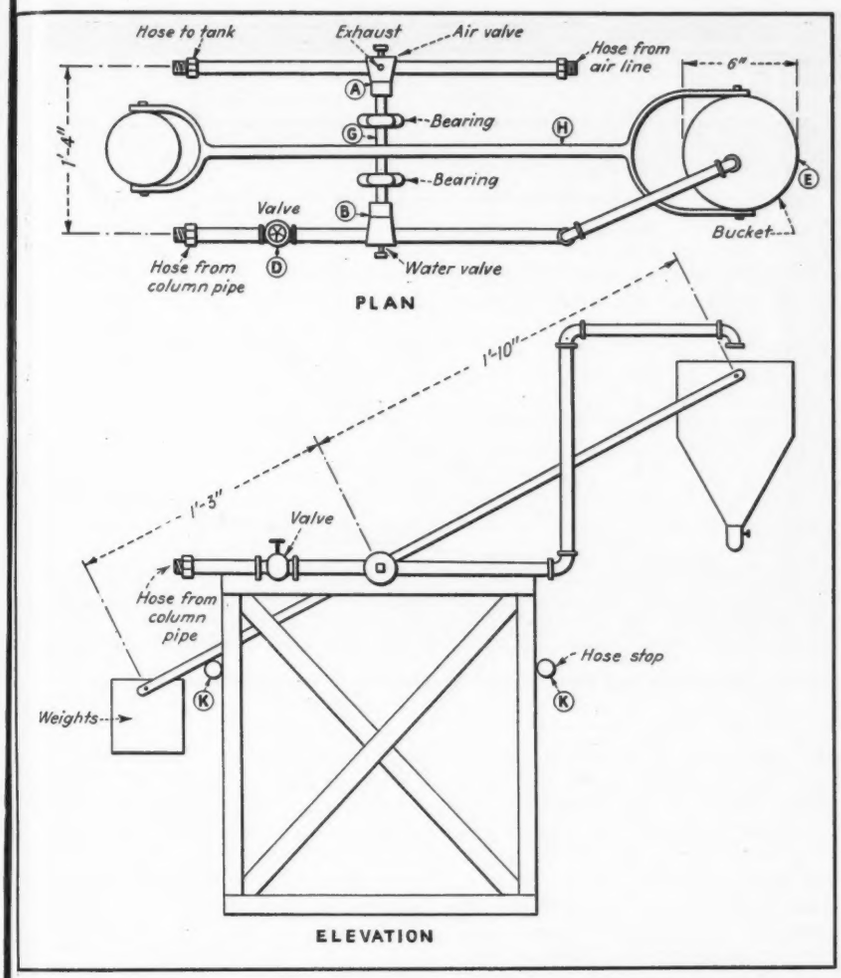


Fig. 2. . . Valve actuating mechanism in detail. Operation is explained in text

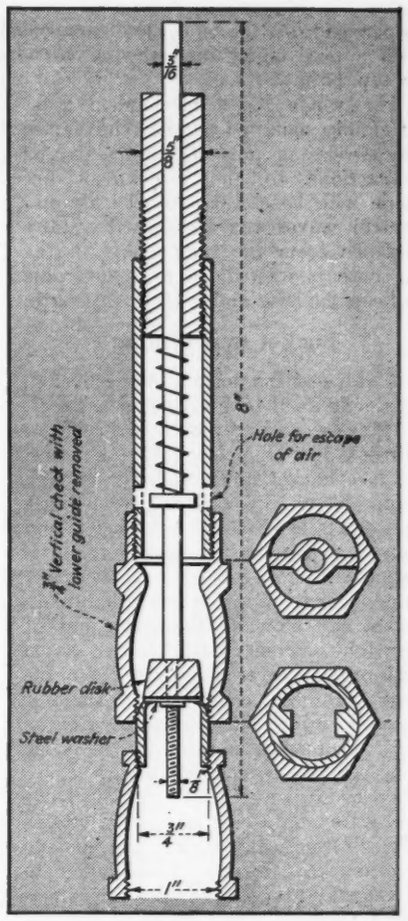


Fig. 3 . . . Auxiliary exhaust valve which provides rapid escape of air from tank. Valve is shown in open position

extends 10 in. into the tank so that the end is water-sealed when tank is full. This valve is set to open a few seconds after plug valve releases air.

Compressed Air and Water Valves

It may be seen that friction in the valves plays a part in the timing, and so for this reason the friction on the valves must remain constant. All sorts of valves were tried, but the arrangement shown in Fig. 4 was the first successful effort. The valves used were old rock-drill valves, which were simple conical plug valves. A sleeve, *B*, is fastened to the shaft, *G*, (see Fig. 2) by setscrew, *C*. The sleeve fits loosely over the end of the plug. The spring, *D*, is for the purpose of pushing the plug out of the cone. Amount of clearance around the plug is controlled by round-end adjusting screw, *E*. A hole, *F*, is bored in the end of the valve, as shown, to prevent pressure from building up and jamming valve. A grease cup is also placed on air valve.

The water valve is the same, except no vent or grease is necessary. The

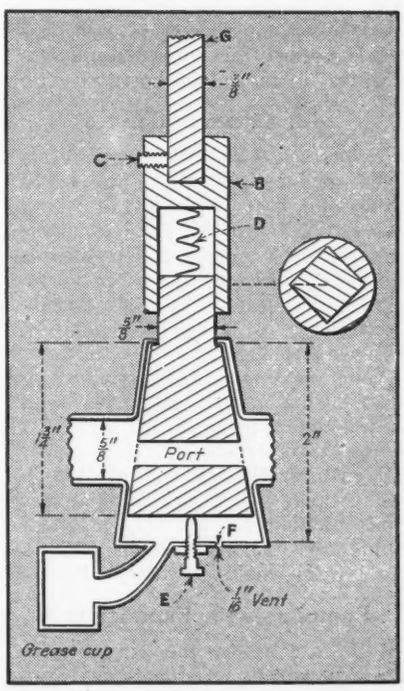


Fig. 4. . . . Air inlet control valve. Water valve is similar, but without grease cup or vent for relieving air pressure

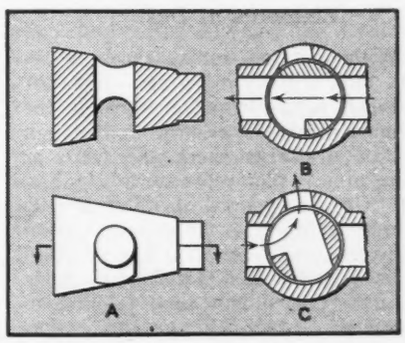


Fig. 5 . . . Construction and operation of air and water three-way valves

valves may be set independently in any position by loosening the setscrews, *C*. The air valve is a three-way valve. This is made from the ordinary plug valve by grinding a groove at right angles to the original port. The cone of the three-way valve is shown in Fig. 5-*A*. If the air valve is mounted as in Fig. 2, the original port should be open when weight can is down and new port should point downward (Fig. 5-*B*) and be on same side as weight can. When bucket goes down, the new port connects with tank, and the

upper end of the old port connects with a hole bored through the valve on top (Fig. 5-*C*).

The whole valve mechanism must be rigidly mounted so that the valves are always in perfect alignment. All connections to the mechanism are made with hose, 1-in. for the air and control valves can be placed at any distance from the tank. Air in the air hose is wasted, so it is desirable to keep the hose under 10 ft. in length.

Bucket and Timing

A valve on the bottom of the bucket, must lend itself to accurate adjustment. A screen should be placed in bucket to prevent dirt from clogging the valve.

Place bucket down and put enough scrap in weight can to overbalance bucket. Close valve on bucket and put enough water in bucket to overbalance weight can and mark water line. Turn on air, push weight can down, and blow all the water out of the tank. Next push bucket down and record the time required for the tank to fill. Fill bucket to line marked, and adjust bucket valve so that the bucket empties in the same time required for filling tank.

Push down weight can, which starts the water out, and adjust valve, *D*, (Fig. 2) so that bucket is filled to line marked in same time taken to discharge water from tank. Start machine operating and make minor adjustments so that idle time is reduced to a minimum. Once adjusted, it seems to operate indefinitely without attention.

Elements of Design

With one 2-in. intake check, a 16-gal. tank will fill in 30 sec. Time of filling is inversely proportional to the number of checks. Shock loss through a 2-in. discharge check and 6 ft. of 2-in. pipe is plotted as curve, *A* (Fig. 6). One half gallon of water is necessary to operate the valves during one cycle.

Let it be assumed that the tank holds 16 gal., the column pipe is 2-in. in diameter, three 2 in. intake checks are to be used, and air pressure is 90 lb. per square inch gage and the static head is 150 ft. Considering Fig. 6 plot the shock less curve, and for each rate of flow add the friction loss to give combined curve *B*.

The static head is 65 lb. per square inch. The air pressure is 90 lb. per square inch: so pressure available for friction is 25 lb. per square inch. Consulting Fig. 6, it is seen that water will be forced out of the tank at the rate of 92 g.p.m. Time of discharge then will be $\frac{16 \times 60}{92} = 10.5$ sec. With three intake checks, the time of filling will be 10 sec. Allow a few seconds for incorrect timing, acceleration of water, and reversal of valves. A cycle will be completed in about 30 sec., or twice a minute; hence, 32 gal. will be pumped each minute. One gal. will be used for timing; so 31 g.p.m. is the pumping rate.

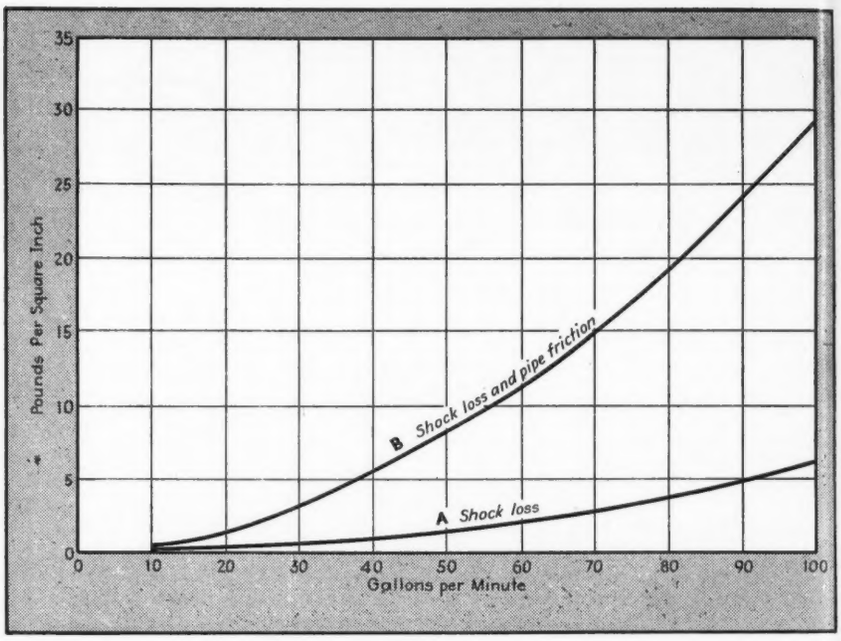


Fig. 6 . . . Shock loss and pipe friction curves used in designing montejus

Rate of filling may be increased by putting on more intake checks and increasing submergence. Rate of discharge may be increased by increasing air pressure and size of column pipe. Advantages of a large tank over a small one are that per gallon raised, less timing water is used, less time is needed for reversal, and less air is lost in the intake hose.

Air Consumption

Compressed air used in one cycle in the tank is 2.14 cu.ft., and in 10 ft. of 1-in. hose, 0.06 cu.ft., making a total of 2.2 cu.ft. If the barometric pressure is 14 7, the free air used is 15.7 cu.ft. This air pumps 15.5 gal., so the air consumption is practically 1 cu.ft. free air per gallon pumped. The over-all efficiency from electricity to water, assuming compression requires 20 hp. per 100 cu.ft. per minute and basing efficiency on static lift only, is 18.8 percent.

A reciprocating pump at 150-ft. head with a 1 to 1 ratio of diameter of air to diameter of water cylinder would use 1.34 cu.ft., and with a 2 to 1 ratio would use 1.59 cu.ft.

Pumping with Expansion

With low heads, the air may be used expansively to advantage. Suppose the static head is 5 lb. per square inch. If the air is throttled so that it enters the tank at 30 lb. per square inch, the pump would work at the same rate as in the problem calculated. The air is now exhausted at 30 lb. per square inch. Much higher rate of pumping can be obtained with little increase in air consumption per gallon if air is taken into the tank at 90 lb., then cut off and allowed to expand to 30 lb. per square inch. A tank full of air will still be exhausted at 30 lb. per square inch, but the mean effective pressure is much higher, so the water will be discharged more rapidly. This air will weigh a little more because it is cooler. If no increase in rate is desired, the air may be expanded to a lower pressure with consequent saving in air consumption.

The expansion cycle is controlled as follows: The three-way air valve is replaced by a single-port valve, or the hole in the three-way valve is plugged. The spring exhaust valve is set to open at desired terminal pressure. The bucket water is adjusted so that the air is cut off when enough air has entered to fill the tank after it has expanded to the terminal pressure.

The expansion system cannot be used for heads over 50 lb. per square inch, because if the exhaust valve is set to open at a pressure above this, it will not close when the air comes in.

Two units like the one described can be arranged to pump alternately through the same column pipe, thus giving a capacity of about 60 g.p.m.

In using the montejus for unwatering a shaft, the tank is weighted to keep it from floating when empty, and lowered by a block and tackle as the water goes down. A hose is used for the column pipe, and the valve mechanism is placed on the surface, shaft station, or sollar.

Mine, Shop, and Plant

Maintaining the Magnetic Pulley

MAXIMUM PERFORMANCE with minimum maintenance is what the user of every kind of equipment wants. Some practical operating tips for those having magnetic pulleys in their plants, to help them reach this goal, are given in the following article prepared by R. L. Manegold, long associated with Dings Magnetic Separator Co.

A well-built magnetic pulley is one of the most dependable pieces of equipment that a mining company will have occasion to use, and because of this it is likely to receive less attention than it should. Pulleys should not be neglected. For concentration or purification, they are a vital link in processing minerals. On tramp iron removal, if they fail to perform properly, it may mean the failure of a crusher.

As to possible causes of electrical failure, it can be truthfully said of magnetic separators built to rigid standards, that electrical failure is almost never the fault of the separator itself. Some of the possible sources of failures and the methods by which they may be prevented or corrected are outlined in the following paragraphs.

1. *Moisture*—If the pulley is operated under extreme moisture conditions, use a moisture-resistant belt and in many cases a pulley specially designed for the service, just as one would employ a water-proof motor under similar conditions.

2. *Excessive voltage*—If the pulley is operated on a higher voltage than that for which it is designed, it will burn out, like any other electrical equipment. Be sure, if a pulley is changed from one circuit to another, that the voltage is checked. If it is higher, a fixed resistor of proper capacity should be installed in series with the pulley.

A possible cause of pulley failure is surging of the applied voltage. This can be caused by other d.c. equipment being operated off the same motor-generator set as the pulley. The best way to install a pulley is with its own M-G set or rectifier.

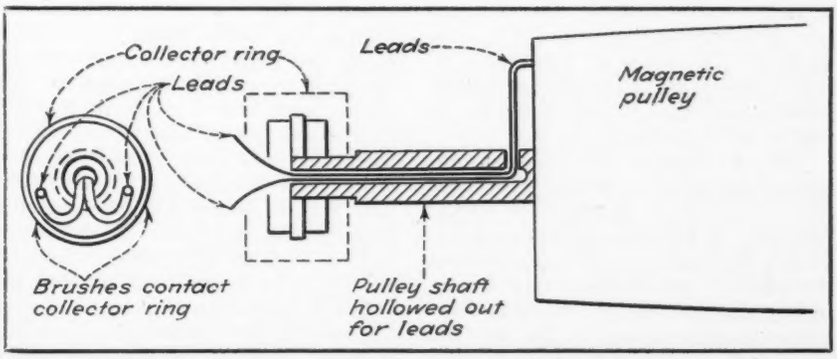
3. *Loose connections and broken leads*—A search for loose connections is one of the first steps that should be taken when a pulley fails to operate properly. Look for broken leads. Also check the leads that go from the collector rings through the pulley shaft and up to the pulley windings. There have been rare cases where a lead under the pulley coil covers has become broken. This can be easily repaired by removing the coil cover, repairing the lead and replacing the cover. Be careful, however, when removing coil covers that the coil underneath is not damaged.

4. *Switch box*—Always check to see that the switch is turned on and functioning properly. See that the "bulls-eye" pilot light is on. Replace the light when it burns out. Look for loose connections. (Use a special switch with a resistance unit on separators consuming 700 watts or more to absorb back E.M.F. Standard switches permit back E.M.F. to surge through the pulley, with up to 30,000 volts occurring, which will burn the pulley out. New units are usually equipped with suitable switches.)

5. *Collector rings and brushes*—Brushes on a magnetic pulley should be watched and replaced, just as on an electric generator or any other equipment. The collector rings should be cleaned and polished whenever necessary.

6. *Motor-generator set failure*—If the pulley fails to get current as indicated by the voltmeter test, the motor-generator set may not be functioning properly and should be checked. One of the most common sources of trouble is the brushes. It is generally desirable to go direct to the manufacturer of this equipment for major repairs.

7. *Rectifier failure*—Rectifiers now commonly used instead of motor-generator sets are of three basic types: tube type, copper oxide, and selenium. If one gets current on the a.c. side of a rectifier and none on the d.c. side, check the rectifier. If it is of the copper oxide or the selenium type, after years of service it may require replacement. If it is a tube type, replacement of tubes is probably necessary.



LOOSE CONNECTIONS may be responsible if pulley fails to operate properly. Look for broken leads. Also check leads running from collector rings through pulley shaft and up to pulley windings

Mechanical Maintenance

Use lagging properly. If lagging must be used, be sure that it is fastened to the steel pole pieces of the magnet, not to the bronze coil covers. There is danger of damaging the coils underneath if it is fastened to the coil covers. Also on an air-cooled pulley, cut the lagging out over the air ducts in the face of the pulley to permit air circulation.

Keep material from getting between the belt and the pulley. Unless this is prevented, an abrasive action will result which will in time cause damaging wear to pulley and belt. Also keep openings in air-cooled pulleys cleaned out so as to maintain maximum heat dissipation.

If there is a hole in the belt, iron will be pulled directly onto the face of the pulley. For this reason it is essential that belts on magnetic pulleys be kept in repair, and as soon as a hole or tear develops, the belt should be patched.

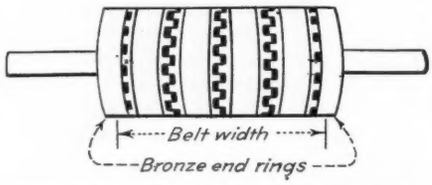
Loose belt lacing permits material on the belt to work through onto the pulley face. Use light-weight belt lacing to minimize the tendency of the magnetic force to pull it out of the belt.

Maintain proper belt tension. To get maximum effectiveness from a magnetic pulley and maximum belt life, it is desirable not to permit too much sag in the belt nor to stretch it too tight. Belt conveyor systems

are usually provided with a means of adjusting belt tension. Pulley-type separators are usually equipped with adjustments for belt tension and alignment of pulley shafts.

Belt weaving causes trouble. It is generally brought about by pulley shafts being out of alignment or because the pulley is not crown faced. When belts weave on magnetic pulleys, they sometimes expose the pole pieces, permitting iron to be attracted and held directly on the face of the magnet. The particles of iron then work under the belt and cause the damage mentioned in previous paragraphs. In the event that belt weaving cannot be overcome mechanically, the installation of skirt boards will be of value. These boards will prevent the material from getting out over the edges of the belt.

Some pulleys are made with non-magnetic bronze end rings so that the



THE MAGNETIC FIELD does not extend to extreme edges of this pulley because non-magnetic bronze end rings are used. Belt should be wide enough to cover only half of these rings

magnetic field does not extend to the extreme edges of the face of the pulley. The belt should be wide enough to extend beyond the outside pole pieces and should cover approximately one half of the bronze end rings. When this practice is followed, no iron can be attracted to the edges of the pulley beyond the belt.

Do not let iron ride the underside of the belt. Sometimes light-weight pieces of iron, or tubular pieces, do not automatically discharge from a magnetic pulley unless special means are provided to cause them to drop off the belt. This results in a seesaw motion of the iron in riding away from the pulley and then being pulled back again, and is very harmful to the belt and sometimes prevents a clean-cut separation. This may generally be overcome by attaching one or more rows of light-weight steel belt lacing across the width of belt. The lacing momentarily becomes an induced magnet, providing sufficient attraction to carry the iron beyond the influence of the pulley to be discharged.

If a pulley face becomes badly worn due to material getting between the belt and the pulley, it can often be repaired by taking a thin cut off the crown face. If the coil covers are badly worn or damaged, new ones can be purchased from the manufacturer.

If the pulley shaft becomes badly worn due to long service or improper lubrication, it can be turned down and put back in service unless the wear is too great. If necessary a new shaft can be installed in a properly equipped shop or the pulley can be returned to the manufacturer for repair.

NOTE: Generally, do not cut the shaft more than $\frac{1}{8}$ in. smaller in diameter than originally furnished. More than this would reduce the diameter to an unsafe point. A magnetic pulley is many times heavier than a standard head pulley. Also, the shaft is hollowed out at one end for the lead wires.

Lubricate the pulley shaft bearings faithfully. Where babbitted bearings are used, inspect them periodically for wear and re-babbitt when necessary. Proper bearing maintenance is not difficult and it will prevent scoring of pulley shaft, thus saving major repairs or replacement of shaft. If anti-friction bearings are used, it is good practice to use one bearing of the expansion type to compensate for slight elongation of the shaft caused by the warming up of the pulley.

Major pulley repairs, particularly coil rewinding, should be handled by a pulley manufacturer who has the special equipment, trained personnel, and knowledge of methods and materials, including wire and insulation, necessary to do the job right. In the long run factory repairs pay dividends.

The Compressor's Auxiliaries

IN ANY compressed air plant the prime unit is, of course, the compressor. There are certain auxiliaries, however, which are important, if not necessary, if the plant is to give over-all maximum results. Practically every compressor requires a receiver of ample size, and, in addition, most plants should use aftercoolers. An approved air filter should be provided in the suction. In addition, protective instruments such as gages, thermometers, relief valves, and drains should be installed when necessary.

The air receiver not only absorbs pulsations in the compressor discharge, but also acts as a reservoir for storing the air, furnishing some reserve capacity to compensate for instantaneous demands in excess of compressor capacity. It acts also as a condenser for some of the moisture in the air, and to collect such condensation as may pass the aftercooler and keep it from entering the distribution system. Receivers are also necessary to give uniformity of pressure for governing instruments. If these governors are connected to the discharge line, any pulsations in it will cause unstable operation.

Obviously, the proper functioning of the receiver is essential to over-all efficiency, and any weakness will be revealed in faulty operation of the plant.

The Compressed Air Institute, which urges the use of auxiliaries, endorses only receivers that meet the requirements of the A.S.M.E. code, and has standardized on a line of them, in sizes and capacities shown in the accompanying table for discharge pressures up to 125 p.s.i. Relief valves must not be set higher than the pressure stamped on the tank.

A.S.M.E. Standard Air Receivers

Diameter In.	*Length Ft.*	*Actual Compressor Capacity* for which Receiver Is Suited, Cu. Ft. Free Air Per Minute*	*Volume Cu. Ft.*
14	4	60	4-¼
18	6	95	11
24	6	185	19
30	7	305	34
36	8	450	57
42	10	640	96
48	12	1,275	151
54	14	1,900	223
60	14	3,000	275
66	18	4,500	428

*For automatic start-and-stop service, extra large receivers are recommended to avoid starting too frequently.

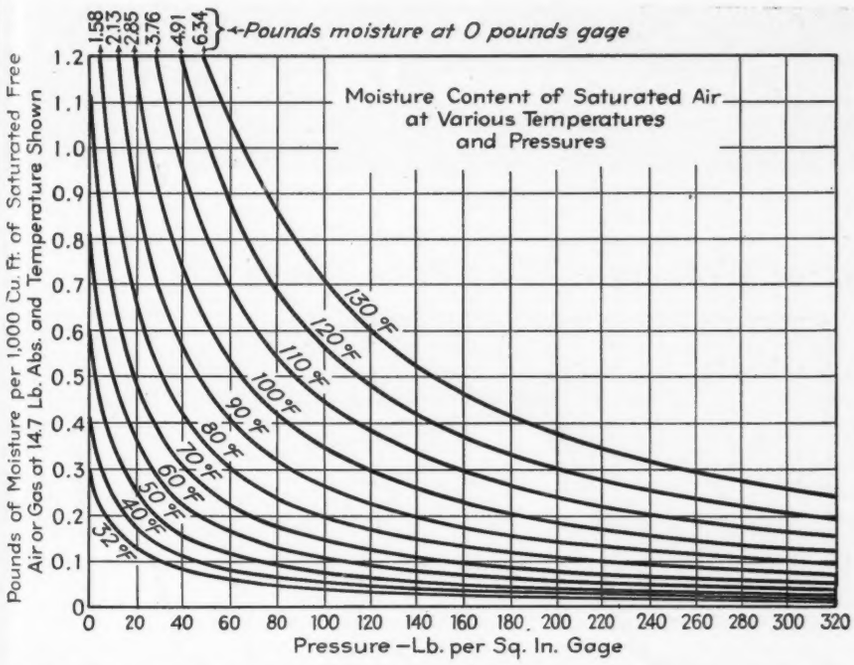
Receivers are furnished complete with safety valves, pressure gage, hand holes or manhole as required by Code, drain valve and nipple, and base for vertical receivers.

Openings for inspection and cleaning are required and must meet specifications of A.S.M.E. Code for Unfired Pressure Vessels.

Aftercoolers are advisable, if not necessary, in nearly every case, to remove water and oil vapors by means of condensation. Compressed air or gas contains moisture, in a degree dependent upon the condition of the air taken in. As the air is compressed, this moisture does not condense, because of the rise in temperature accompanying compression, and thus it is carried along as a vapor through the receiver and into the pipeline. The temperature falls rapidly in the discharge line due to radiation, resulting in much water being condensed here. Aside from being objectionable in the line, this is destructive to pneumatic tools or other equipment using the air.

It is to force this precipitation by lowering the temperature of the air before it enters the discharge line that aftercoolers are employed. They are installed near the compressor to condense the moisture before it can enter the line, and require automatic traps.

Aftercoolers are of the shell-and-



THIS AIR-REACTION GRAPH, giving the moisture content of saturated air at various temperatures and pressures, suggests the importance of providing an aftercooler of proper design and capacity as an auxiliary to the compressor

tube type and depend for satisfactory performance upon the use of the coldest water available. Obviously, unless the unit is of liberal size, cooling will be incomplete and the maximum amount of water will not be removed. The importance of installing aftercoolers of proper design and capacity is indicated by the accompanying air-reaction chart.

It will be noted that if 1,000 cu.ft. of saturated air is drawn into a compressor at atmospheric pressure and at a temperature of 70 deg. F., it will contain 1.12 lb. of moisture. This moisture will condense somewhere along the line and the water will pass into any mechanical equipment for which the air is used, causing rapid wear. Much loss of time and air is also caused by the need for blowing out the air lines each time the air is used for blowing away chips and like purposes.

Aftercoolers also provide an element of safety. In case any carbon accumulating on the walls of the discharge pipe becomes incandescent and starts to burn (which might occur with careless operation, such as using too much oil of inferior quality and if valve and piston leakage exists) the fire is quenched as it enters the aftercooler.

To obtain air as cool as possible, it is usual to run the intake pipe outside of the building. The compressor inlet must be provided with air filters to prevent dust and grit from getting into the compressor, where it causes wear of working parts, and combines with lubricating oil as binder to form an obstructive and abrasive coating on the cylinder and valves. This carbon can cause leakage by getting under the valves.

Use of a filter is also an element of safety in operation, since the elimination of sand will prevent a spark which might be dangerous where operation is such as to cause a combustible mixture to form in the discharge line.

Efficient filters have become so standardized and relatively cheap that the earlier method of installing a home-made filter of questionable efficiency is no longer justifiable. The manufacturer best knows what size and type of filter will give best service, with the least pressure drop. A suction filter should not cause a drop in the suction line of more than 2 in. of water.

When the noise of the suction is objectionable, an air silencer should be used. Several makes are available. Obviously, the silencer should not offer excessive resistance to the air flow.

Discharge silencers are also available when there is excessive noise on the discharge, resulting from discharge pulsations against the air-receiver.

Protective devices should be provided in every system. If a shut-off valve is installed in the discharge line, a relief valve must be placed on its compressor side to protect the machine in case the operator should start before opening the valve. Part of the standard equipment of receivers is a relief valve, but that will not protect the compressor if a shut-off valve is located between it and the receiver.

Drains of ample size should be installed, where needed. Condensate must be carried away and not allowed to pass through the next compressor cylinder. It is well to make these drains automatic but care must be taken to insure that the automatic trap works.

In many cases, especially on the larger units, an overspeed shut-down is desirable; such machines usually have limiting speed governors as standard equipment. A device can be added that will shut the compressor down if the governor should stick.

For larger equipment, shut-down in case of lube oil failure is also desirable, the unit usually being shut down automatically. In certain installations, however, shut-down may be very undesirable, and in such cases the device could sound an alarm.

Shut-down in case of jacket-water failure serves to protect the machine if the operator fails to turn on the cooling water or the water supply fails.

Rope Dope

FACTS about its hoisting ropes from the records of one important iron-ore operator for four different mines are:

Mine No. 1, for two skips in balance, used 35 ropes from five manufacturers over an 18-year period. Averages per rope were: 130,718 tons hoisted, 397 days in service.

Mine No. 2, for two balanced skips, used 44 ropes from six makers over a period of 20 years. Average tons were 127,460. Average days were 253.

Mine No. 3, for two balanced skips, used 27 ropes from six manufacturers over a period of 20 years. Average tons per rope 240,176, and days, 446.

Mine No. 4, for two shaft hoists, used 23 ropes from five manufacturers over a 21-year period. Average tons per rope were 316,352. Average days per rope 734.

All ropes were of plow steel, hemp center, 6x19, 1¼-in. diameter, regular lay.

The shaft at Mine No. 3 is deeper than the shafts at the first two mines and the ropes are correspondingly longer. In like manner, the shaft at No. 4 is deeper than that at No. 3 and the ropes are proportionately longer. This may be the explanation for the superior performance of the ropes in these shafts as compared with those used at Nos. 1 and 2.

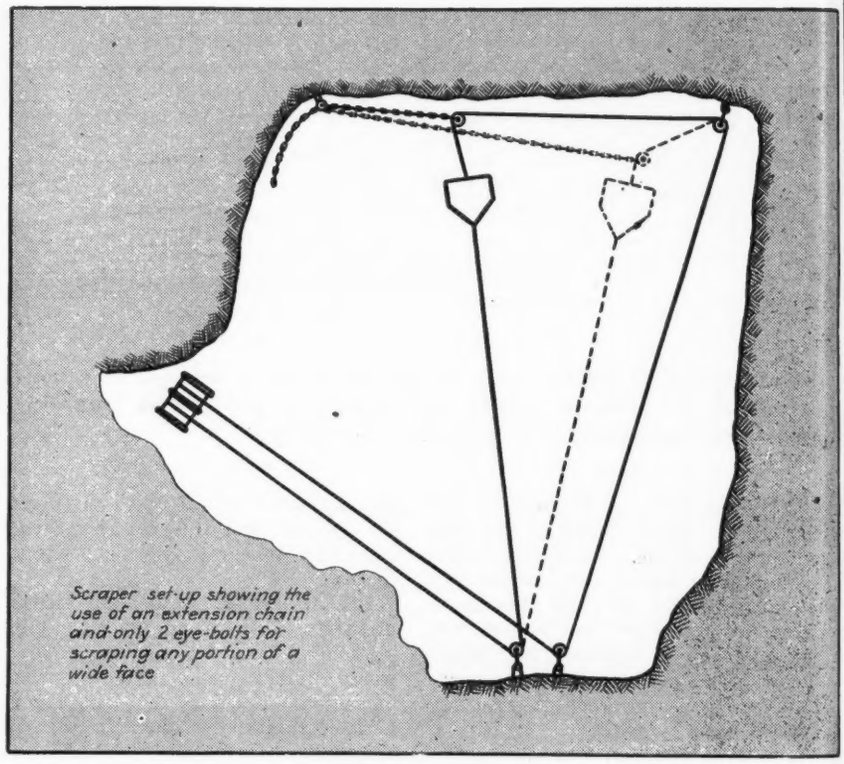
Useful Operating Ideas

Scraper Set-Up for Working a Wide Face Effectively

SCRAPING MUCK out of a wide face in an open stope can become a long process if a new anchorage must be provided for the tail rope sheave every time it is desired to change the path of the scraper. T. M. Waterland, efficiency engineer of Britannia Mining & Smelting, Ltd., Britannia Beach, B. C., describes an installation which greatly speeded operations in his company's Britannia mine.

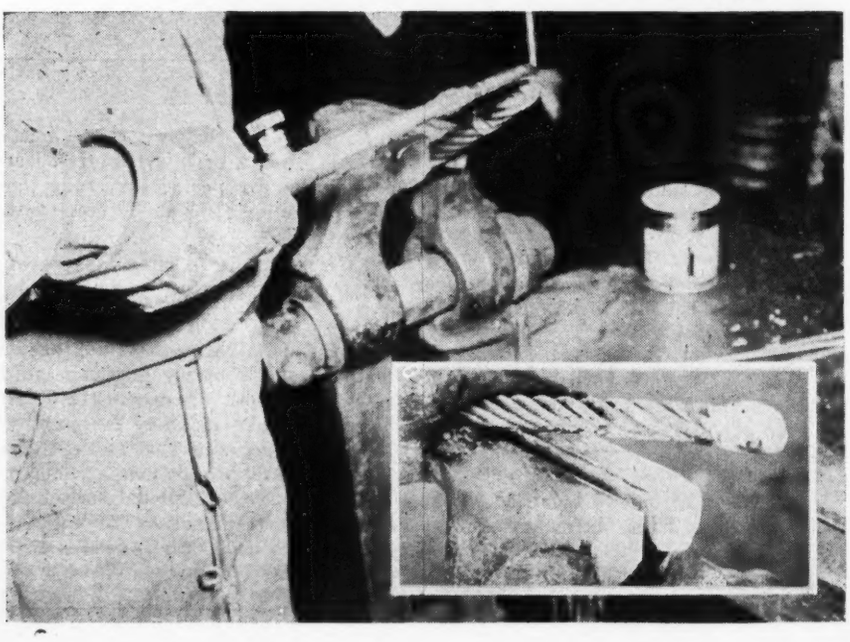
The method is shown in the adjacent diagram. Two eyebolts were set into opposite corners of the face to be mucked out, and a length of heavy chain was run through one of them, attached to it in a way that permitted easy lengthening or shortening of the working end of the chain. A small snatch block was attached to the end of the chain, and a similar block was fastened to the eyebolt in the opposite corner of the face.

The haulback cable was then run through both these blocks as shown and attached to the back of the scraper. Thereafter, it was necessary only to lengthen or shorten the chain in order to move the scraper path along the face of the stope.



Scraper set-up showing the use of an extension chain and only 2 eye-bolts for scraping any portion of a wide face

Making Wire Rope Ends Safe by Bronze Brazing



EXPOSED ENDS of wire rope present a constant danger of injury and infection to those working with the rope because of the ease with which the sharp wires inflict puncture wounds or lacerations. F. L. Spangler, of the American Society of Safety Engineers, suggests a method of eliminating this danger, with regard to rope-ends at least, by brazing the end with bronze welding rod and running the bronze back an inch or two from the end. The operation and the result are shown in the accompanying photographs.

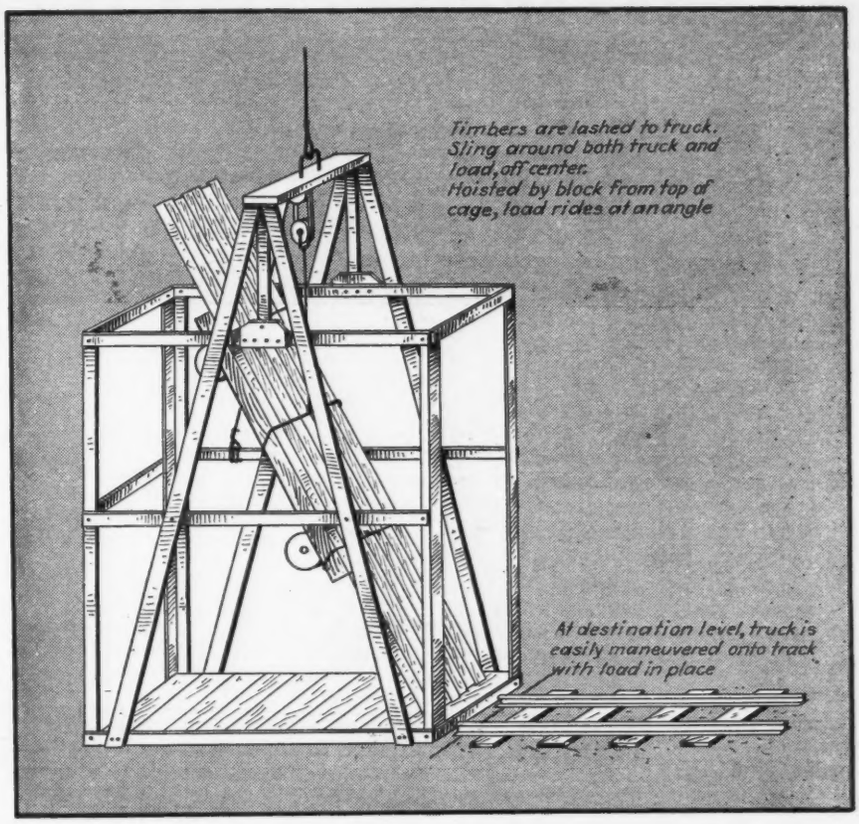
Ends of preformed rope can be brazed without seizing beforehand, but if the rope is not preformed, it is recommended that two or three seizings be applied before the rope is cut, one close to the end and the others four inches apart behind it. In any case seizing prevents flattening of the rope during the cutting operation if a cold-cut is used.

Handling Timbers on Mine Cars Safely and Easily

MOVING LONG TIMBERS into and out of the cages in which they are lowered down the shaft is a problem most miners solve by main strength and awkwardness. Tiring of the difficult and dangerous job of handling 16-ft. timbers one by one in a 9-ft. cage, the staff of the Spruce mine of Oliver Iron Mining Co. at Eveleth, Minn., worked out a timber-handling method which eliminates the labor and danger involved in older methods.

As shown in the accompanying diagram, the timbers to be lowered are loaded on a flat mine car and secured firmly. A sling is then thrown around both the load and the car at a point ahead of the center of gravity, and by using a chain hoist, hung from a supporting member in the roof of the cage, the load and the car are pulled into the cage, where they hang in the position shown in the sketch.

When the cage is lowered to the level where the timbers are to be used, the chain hoist is slacked off and the timbers are easily guided out of the cage in such a way that the flat car underneath comes to rest directly on the rails at the station. The sling is then detached and the timbers are ready to be hauled away with no further loss of time.

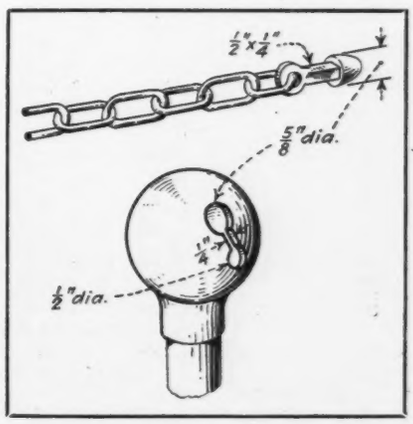

Timbers are lashed to truck. Sling around both truck and load, off center. Hoisted by block from top of cage, load rides at an angle
At destination level, truck is easily maneuvered onto track with load in place

Simple Chain Barrier for Pipe Railing

WHEREVER it is desired to close an opening in pipe railing by a barrier which is easily installed or removed, the following suggestion, furnished by Charles Labbe, of Johnnie, Nev., will be found useful. A chain of suitable length is furnished at both ends with a T-head, forged, for example, out of a rivet in the manner shown in the accompanying sketch. Two holes should then be drilled into the ball fitting on the railing at the points where the chain will be attached, and the holes should then be connected by a slot in the manner shown.

Dimensions should be as shown, or should bear the same relationship to each other. When the forged ends of the chain are dropped into the slots in the fittings, they will hold there securely, but they can easily be removed when desired.

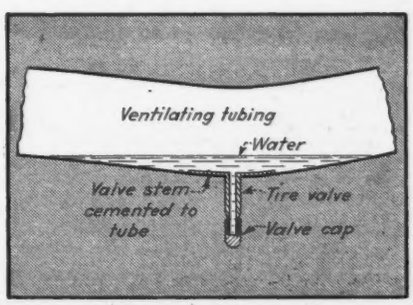
Appearance of the resulting railing installation will be greatly improved, and, in addition, this device is far safer than any makeshift arrangement.



Tire Valves Drain Water From Rubber Ventilation Tubing

RUBBERIZED ventilation tubing, hung in a mine drift over a long distance, gradually picks up on its inner surfaces a great deal of moisture condensed from the air passing through it. This moisture collects in pools at low spots in the tubing, and if it is not drained periodically, the accumulated load of water may tear the tubing from its supports.

Raymond E. Anker writes that in a Western mine in which he worked, the miners, upon finding a sagging, water-filled section of ventilation tubing, would often simply puncture the tubing with their knives, thus letting out the water but spoiling the tubing. After losing considerable time and money in repairs, the company devised the arrangement shown. Tire tube valves are placed all along the tubing at suitable intervals, and the ventilation men simply drain the tubing through them as often as necessary.



SUMMARY OF THE MARKETS

FAVORABLE WAR NEWS last month created an atmosphere of uncertainty in the market for non-ferrous metals. In so far as the major metals were concerned, operators sensed a trend toward a more conservative inventory policy on the part of consumers. The minor metals were on edge because of some doubt in connection with the future of Metals Reserve contracts. The price of quicksilver in the New York market actually declined moderately on increased selling pressure, and this occurred in spite of the purchasing program of Metals Reserve that extends to Dec. 31, 1944. Late in the month it was announced in Canada that the contracts of Canadian producers of cobalt and quicksilver with Metals Reserve are not expected to be renewed.

In copper circles, it was felt that the metal no longer belongs on the "most critical" list. This feeling was strengthened when the Combined Copper Committee announced late in September that the United Nations have now reached a "rough balance" between supply and actual consumption. The position of copper has been much improved, it was stated officially, because of an improved shipping situation, a larger return of scrap than expected, and the conservation measures still in force. However, the committee stressed that the balanced position of copper is dependent on maintaining existing and projected production rates. The labor situation at copper mines has shown improvement, but it appears that difficulties have yet to be overcome at the fabricating plants. WPB has stated that action is being taken to remedy labor shortages at the brass mills. Fabricators obtained copper at about the same rate as in prior months. The stockpile continues to increase. As September ended there were no signs pointing to an early revision of the conservation regulations that govern civilian consumption of copper. A few minor changes affecting essential civilian

UNITED STATES MARKET

1943 Sept.	Electrolytic Copper: Domestic (a) Refinery	Electrolytic Copper: Export (b) Refinery	Straits Tin: New York	Lead: New York	Lead: St. Louis	Zinc: St. Louis
1	11.775	11.700	52.000	6.50	6.35	8.25
2	11.775	11.700	52.000	6.50	6.35	8.25
3	11.775	11.700	52.000	6.50	6.35	8.25
4	11.775	11.700	52.000	6.50	6.35	8.25
6	Holiday	11.700	Holiday	Holiday	Holiday	Holiday
7	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
10	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
13	11.775	11.700	52.000	6.50	6.35	8.25
14	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
16	11.775	11.700	52.000	6.50	6.35	8.25
17	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
20	11.775	11.700	52.000	6.50	6.35	8.25
21	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
23	11.775	11.700	52.000	6.50	6.35	8.25
24	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25
27	11.775	11.700	52.000	6.50	6.35	8.25
28	11.775	11.700	52.000	6.50	6.35	8.25
29	11.775	11.700	52.000	6.50	6.35	8.25
30	11.775	11.700	52.000	6.50	6.35	8.25
AVERAGES FOR MONTH						
Sept.	11.775	11.700	52.000	6.50	6.35	8.25
AVERAGES FOR WEEK						
Sept. 1	11.775	11.700	52.000	6.50	6.35	8.25
8	11.775	11.700	52.000	6.50	6.35	8.25
15	11.775	11.700	52.000	6.50	6.35	8.25
22	11.775	11.700	52.000	6.50	6.35	8.25
9	11.775	11.700	52.000	6.50	6.35	8.25
CALENDAR WEEK AVERAGES						
Sept. 4	11.775	11.700	52.000	6.50	6.35	8.25
11	11.775	11.700	52.000	6.50	6.35	8.25
18	11.775	11.700	52.000	6.50	6.35	8.25
25	11.775	11.700	52.000	6.50	6.35	8.25

SILVER, GOLD AND STERLING EXCHANG

1943 Sept.	Sterling Exchange: "Checks" (Nominal)	Sterling Exchange: "90-day demand"	Silver: (c) New York	Silver: London	Gold: London	Gold: (d) United States
1	401.000	(f)	44.750	23.500	168s	$35.00
2	401.000	(f)	44.750	23.500	168s	35.00
3	401.000	(f)	44.750	23.500	168s	35.00
4	401.000	(f)	(e)	(e)	(e)	35.00
6	Holiday	(f)	Holiday	23.500	168s	Holiday
7	401.000	(f)	44.750	23.500	168s	35.00
8	401.000	(f)	44.750	23.500	168s	35.00
9	401.000	(f)	44.750	23.500	168s	35.00
10	401.000	(f)	44.750	23.500	168s	35.00
11	401.000	(f)	(e)	(e)	(e)	35.00
13	401.000	(f)	44.750	23.500	168s	35.00
14	401.000	(f)	44.750	23.500	168s	35.00
15	401.000	(f)	44.750	23.500	168s	35.00
16	401.000	(f)	44.750	23.500	168s	35.00
17	401.000	(f)	44.750	23.500	168s	35.00
18	401.000	(f)	(e)	(e)	(e)	35.00
20	401.000	(f)	44.750	23.500	168s	35.00
21	401.000	(f)	44.750	23.500	168s	35.00
22	401.000	(f)	44.750	23.500	168s	35.00
23	401.000	(f)	44.750	23.500	168s	35.00
24	401.000	(f)	44.750	23.500	168s	35.00
25	401.000	(f)	(e)	(e)	(e)	35.00
27	401.000	(f)	44.750	23.500	168s	35.00
28	401.000	(f)	44.750	23.500	168s	35.00
29	401.000	(f)	44.750	23.500	168s	35.00
30	401.000	(f)	44.750	23.500	168s	35.00
AVERAGES FOR MONTH						
Sept.	401.000	.....	44.750	23.500	....	35.00
AVERAGES FOR WEEK						
Sept. 1	401.000	.....	44.750	.....	....	.....
8	401.000	.....	44.750	.....	....	.....
15	401.000	.....	44.750	.....	....	.....
22	401.000	.....	44.750	.....	....	.....
29	401.000	.....	44.750	.....	....	.....

Calendar week averages, New York Silver: Sept. 4th, 44.750; 11th, 44.750; 18th, 44.750; 25th, 44.750.

(e) Not quoted (Saturday). (f) No quotations.

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis, as noted. All prices are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.225c. per pound, the average differential for freight and delivery charges.

(b) Export prices are net at refineries on the Atlantic seaboard and include sales of domestic copper in the foreign market. Owing to the World War and the disruption of normal trade relations, our export copper quotations, since September, 1939, have been based largely on f.a.s. transactions, ex United States ports. We deduct .05c. from the f.a.s. basis (lighterage, etc.) to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingot bars; cathodes are sold at a discount of 0.125c.

Quotations for zinc are for ordinary Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West in nearly all instances command a premium of 1c. per pound over the current market for Prime Western but not less than 1c. over the *Engineering and Mining Journal's* average quotation for Prime Western for the previous month.

Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

(c) Silver other than newly-mined domestic by Handy & Harman. Under Treasury order of July 6, 1939, the price on domestic newly-mined silver mined subsequent to July 1, 1939, was fixed at 71.11c. per troy ounce. Handy & Harman's quotations on newly-mined domestic silver 999 fine was 70⅝c. throughout September.

(d) U. S. Treasury's gold price. Actual payment by the United States Treasury for gold of domestic and imported ore or concentrate is 99.75 per cent of the price quoted by the Treasury, which at present is equal to $34.925.

uses have been made, but no tonnages were involved.

Control over the zinc supply remains tight, though conditions in the industry have not changed much one way or the other in recent months. Production could be increased if sufficient labor were on hand at some of the mines and smelters. As in copper, the reserve supply has been growing.

Demand for lead has been good, averaging close to 65,000 tons a month. Part of this tonnage consists of lead imported from Mexico and elsewhere.

The price schedule for tin has been revised by OPA to bring the regulations in line with present-day conditions. Grade B tin is now defined as containing a minimum of 99.80 percent tin and not more than 0.05 percent arsenic, and carries a ceiling price of 51¼c. Longhorn 2 Star, 99.50 percent tin, has been established at 51¼c. Grade A is unchanged at 52c. Metal & Thermit and Vulcan brands have been provided for.

MONTHLY AVERAGES

Monthly averages for copper, lead, zinc, tin, silver (New York and London), gold, and sterling exchange appear on preceding page. Average prices of miscellaneous metals for February and March follow:

	August	Sept.
Quicksilver, N. Y. flask	196.000	195.720
Antimony (a)	15.839	15.839
Antimony, bulk, Laredo	14.500	14.500
Antimony, bulk, N. Y.	15.265	15.265
Antimony, Chinese (b)	16.500	16.500
Platinum, oz. troy	35.000	35.000
Cadmium (c)	90.000	90.000
Cadmium (d)	92.500	92.500
Cadmium (e)	95.000	95.000
Aluminum, ingot	15.000	15.000
Magnesium, ingot	20.500	20.500

(a) New York, packed in cases, in lots of 5 tons or more but less than a carload. (b) Nominal. (c) Producer's price for commercial sticks. (d) Average of producer's and plater's quotations. (e) Special shapes sold to platers.

E & M J PRICE INDEX

Weighted index of non-ferrous metal prices (copper, lead, zinc, tin, silver, nickel, and aluminum). The average for the years 1922-1923-1924 equals 100.

1929	110.33	1936	73.45
1930	82.87	1937	90.86
1931	60.20	1938	73.67
1932	48.26	1939	77.71
1933	59.79	1940	79.22
1934	69.59	1941	83.49
1935	74.66	1942	86.80

	1941	1942	1943
January	82.48	85.39	88.74
February	82.76	85.90	88.74
March	83.27	85.90	88.74
April	83.48	85.90	88.74
May	83.51	85.90	88.74
June	83.48	85.90	88.74
July	83.60	85.90	88.74
August	83.39	85.90	88.74
September	83.34	88.74	88.74
October	83.84	88.74	....
November	84.32	88.74	....
December	84.42	88.74	....

CURRENT PRICES—MISCELLANEOUS METALS, ORES, AND NON-METALLIC MINERALS

Quotations cover wholesale lots, prompt shipment, f.o.b. New York, unless otherwise stated

(Oct. 1, 1943)

MISCELLANEOUS METALS

Aluminum, ingot, 99 plus per cent, lb	15c.
Antimony, domestic, spot, lb. 5 tons or more	15.839c.
Bismuth, ton lots, lb	$1.25
Cadmium, commercial sticks, lb	90c.
Calcium, lb., ton lots 97 @ 98 per cent	$1.25
Chromium, 97 per cent grade, lb	89c.
Cobalt, 97 to 99 per cent, per lb	$1.50
Nickel, electrolytic cathodes, lb	35c.
Magnesium, 99.8 per cent, carloads, lb	20½c.
Palladium, troy oz	$24.00
Platinum, (Official quotation) troy oz	$35.00
Quicksilver, flask of 76 lb., 100 flasks or more	$195.00@$197.00
Radium, mg. radium conten	$25.00@$30.00
Selenium, 99.5 per cent, lb	$1.75
Silicon, minimum 97 per cent, spot, carloads lb	14.75c.
Tellurium, lb	$1.75
Thallium, 100 lb. or more, lb	$10.00
Titanium 96 to 98 per cent, lb	$5.00

METALLIC ORES

Beryllium Ore, 10 to 12% BeO. f.o.b. mines, ton	(b)$100.00@$120.00
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry, 48% Cr_2O_3, 2.8 to 1 ratio	$41.00
48% Cr_2O_3, 3 to 1 ratio	$43.50
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$4.75
Mesabi bessemer	$4.60
Old Range non-bessemer	$4.60
Mesabi, non-bessemer	$4.45
Lead (Galena) 80 per cent, Joplin, Mo., ton	$76.54
Manganese (dutiable) f.o.b. cars Atl. ports, long ton unit Mn:	
50 per cent	79.8c.
48 per cent	78.8c.
46 per cent	76.8c.
Manganese Ore, domestic, 48%, f.o.b. MRC depot, l.t. unit	$1.00
Molybdenum Ore, 90%, per lb. of MoS_2, f.o.b. mines	45c.
Tungsten Ore, per unit of WO_3:	
Chinese, 65 per cent, duty paid	(b) $24.00
Domestic, 65 per cent and upward	(a) $26.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	27.50c.
Zinc Ore, Prime, 60 per cent concentrate, Joplin, Mo.; per ton	$55.28

(a) Prices at mines, small lots, usually several dollars less. (b) Nominal

METALLIC COMPOUNDS

Arsenious Oxide (arsenic) lb	4c.
Cobalt Oxide, 70 @ 71 per cent, lb	$1.84
Copper Sulphate, 100 lb	$5.00

ALLOYS

Beryllium Copper, 2.5 to 3 per cent Be, per lb. of contained Be	$15.00
Ferrochrome, 65 @ 70 per cent per pound of Cr contained	13c.
Ferromanganese, 78 @ 82 per cent, gross ton	$135.00
Ferromolybdenum 55 @ 65 per cent Mo. lb. of Mo. contained	95c.
Ferrosilicon, 50 per cent, per lb. of contained Si	6.65@8.10
Ferrotungsten, 75 @ 80 per cent, lb. of W contained	$1.90
Ferrovanadium, per lb. of V, delivered	$2.70@$2.90
Silicomanganese, 1 per cent C, gross ton	$133.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canadian (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$650@$750
Crude No 2	$165@$385
Spinning fibers	$124@$233
Paper stock	$44@$49.50
Shorts	$14.50@$26.50
Vermont, f.o.b. Hyde Park:	
Shingle stock	$62.50@$65.00
Paper stock	$44.00@$53.00
Shorts	$14.50@$28.50
Floats	$19.50
Barytes, long ton:	
Georgia, crude	$8.50@9.00
Missouri, 93 per cent $BaSO_4$, less than 1 per cent iron	$6.75@$7.25
Bauxite, long ton:	
Domestic, crude, 50 @ 52 per cent (not dried)	$5.00
Domestic, chemical, 55 @ 58 per cent	$7.50@$8.50
Domestic, abrasive, 80 @ 84 per cent	$16.00
China Clay, f.o.b. mines, ton:	
South Carolina and Georgia, No. 1, bulk	$6.75@$8.00
Delaware, No. 1	$15.00
Feldspar, bulk, ton:	
Potash feldspar, 200 mesh	$17.00
Glass-spar, white, 20 mesh	$11.75
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois 85-5 per cent, all rail movement, ton	$33.00
Acid 98 and 1 per cent, bulk, ton	$37.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00@$14.00
Magnesite, per ton dead-burned, f.o.b. Washington	$22.00
Mica—Base prices on sheet, North Carolina one-half trim, as posted by the Colonial Mica Corp., the Government's buying agency for obtaining strategic mica, per pound, follow: Sheet to cut minimum of 1½ × 2 in. $2.40; 2 × 2 in. $3.52; 2 × 3 in. $4.64; 3 × 3 in. $5.12; 3 × 4 in. $6.08; 3 × 5 in. $7.04; 4 × 6 in. $8.00; 6 × 8 in. $9.12; punch, 30c. Premium and discounts up to 40 per cent, depending on quality and trim. Scale does not apply to non-strategic mica.	
Ocher, Georgia, ton	$19.00@$22.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	12c., nom.
Silica, in bags, 325 mesh. ton	$20.00@$40.00
Sulphur, Texas, mines, long ton	$16.00
Talc, f.o.b. works, ton:	
New York, double air-floated, 325 mesh	$12.00@$15.00
Vermont, extra white, 200 mesh	$9.50@$10.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$14.50
200 mesh, cream colored	$26.00

IRON AND STEEL

Pig Iron, Valley furnaces, gross ton: Basic	$23.50
Steel, base prices, Pittsburgh Billets, gross ton	$34.00
Structural shapes, 100 lb	$2.10

Personal Items

L. H. Frisbie, mining engineer with the Reconstruction Finance Corp., has been at Chloride, Ariz., inspecting work at several properties in that area.

Tom Chapman, head mining engineer at Tucson, Ariz., for the U. S. Bureau of Mines, with **Elred Wilson,** also a Tucson mining engineer, has been at Kingman, Ariz., examining mineral deposits in the district.

Cornelius Francis Kelley, chairman of the board of Anaconda Copper Mining Co., and associated also with more than 30 other industrial and professional organizations, has been awarded the Charles F. Rand memorial medal by the board of directors of the A.I.M.E., for "conspicuous administrative success in his field and for inspiring leadership and related achievements in the financial and industrial world." Presentation of the award will be made at the annual meeting of the A.I.M.E. at the Waldorf-Astoria, in New York, on Feb. 22, 1944.

John W. MacKenzie has joined the staff of Francoeur Gold Mines, Ltd., at Arntfield, Quebec.

Robert M. Belliveau, mining engineer, is at the Embarrass iron ore property, near Biwabic, Minn., in charge of stripping operations for Winston-Morrison-Utah, contractors. He was formerly associated with Phelps Dodge at Morenci in the development of a large open-pit copper project.

Francis Frederick, geologist of San Francisco, is making a survey of quicksilver deposits in Oregon for the State Department of Geology and Mineral Industries. The results of his work will be published as a bulletin.

A. D. Clark has resigned as superintendent of Arkansas Ordnance Works. Mr. Clark, who had held the post for eighteen months, leaves to take an active part in the development of his bauxite interests. He will be succeeded by **J. B. Cumming,** former plant safety director.

C. J. Eggleston, of Brookline, Mass., vice president and consulting engineer for U. S. Smelting, Refining & Mining Co., inspected Utah operations in September.

G. H. Cunningham, consulting engineer for American Smelting & Refining Co., has completed his work on the company's new electrolytic zinc plant in Texas, and is now at Perth Amboy, N. J., assisting in the development of treatment methods for the company's nickel orebodies in Brazil.

Alexander H. Kingaard is now employed as chief engineer and manager for Compania Minera del Gran Oeste at that company's tungsten mines in Lower California, Mexico. The company employes about a hundred men. Previously to his present professional work Mr. Kingaard was with the McNeil Construction Co. as construction engineer for its Basic Magnesium project at Las Vegas, Nev.

J. A. Costa has been appointed assistant superintendent of mines for Noranda Mines, Ltd., Quebec, Canada. He succeeds **A. D. Carmichael** who has retired after 13 years service. **R. E. Findlay** has been appointed assistant manager under Mr. Costa.

W. S. Kirkpatrick has been appointed assistant to James Buchanan, general manager of Consolidated Mining and Smelting Company of Canada. Other executive appointments recently announced by the company are: **Frank S. Willis** as superintendent of the electrolytic zinc plant, succeeding **B. A. Stimmel,** retired; **Thomas H. Weldon** as assistant superintendent of the electrolytic zinc plant; **James Bryden** and **D. S. Wetmore** as assistant chief metallurgists; **L. M. DeLong** as superintendent of the zinc leaching plant; and **Dr. Charles A. H. Wright** as consulting engineer for the company's "Project 9."

Edward Thornton has resigned as vice-president and general manager of Krome Corp., Marshfield, Ore., and has removed to Salt Lake City, Utah.

Malcolm C. Brown is now assistant superintendent of the Sidney Mining Co., Kellogg, Ida. He was formerly on the mining engineering staff of Bunker Hill & Sullivan Mining & Concentrating Co.

Ward C. Ball has been appointed assistant district superintendent of Federal Mining and Smelting Co. in the Tri-State area. He was formerly personnel and safety director for the company.

Major Glenville A. Collins, U. S. Army retired, visited Vancouver last month. He is well known there as manager of a dragline-dredging operation in the Cariboo two years ago. He has also been active in California's gold-dredging industry.

Ridgeway R. Wilson, with offices in the Bank of Nova Scotia bldg., Vancouver, is directing exploration for St. Eugene Mining Corporation, Ltd., in British Columbia, Yukon and Alaska.

Prof. Frank A. Forward, chairman of the British Columbia Division of C.I.M.M., has recovered from an attack of pneumonia.

G. R. Fisher, underground manager of Zinc Corporation, Ltd., Broken Hill, New South Wales, has accepted a position with the Allied Works Council, which is engaged on works in connection with defence, and is in charge of large construction operations in the north of Australia.

Edward S. McGlone, general superintendent of mines in Butte, Mont., for the Anaconda Copper Mining Co., has been appointed general manager of mining and metallurgical operations for the company in both Montana and Idaho—a post just created, Mr. McGlone being the first man to serve in the capacity named. **H. J. Rahilly** succeeds Mr. McGlone as general superintendent of mines. The appointments took effect on Sept. 22. Mr. McGlone will make his headquarters in Butte. He came to Butte immediately following his graduation from the Colorado School of Mines in 1923. He has spent his entire professional career in the Montana city. Mr. Rahilly has been with Anaconda since 1917.

Alan C. Harrison, who was mill superintendent with Burma Corporation, Ltd., Burma, until enemy action compelled the evacuation of that country, is with the department of supply and shipping, engaged in work in connection with mineral production.

Hugh M. Murray, mill superintendent with Mt. Lyell Mining & Railway Co. Ltd., Queenstown, Tasmania, is on a visit to the United States.

Norman C. Stines, mining engineer of Anchorage, Alaska, reached Vancouver last month after a trip over the Alaska Military Highway. Chief purpose of his tour was to examine coal deposits in the Peace River Block.

R. H. Channing, of New York, and **J. P. Caulfield,** of Flin Flon, president and general superintendent respectively of the Hudson Bay Mining & Smelting Co., Ltd., visited northern British Columbia and southern Yukon last month. The company has three parties prospecting in that area.

W. J. Asselstine, former British Columbia Minister of Mines, has resigned as executive assistant to **William McKinstry,** acting regional superintendent of the National Selective Service, to devote more time to his private practice as consulting metallurgist.

F. S. Norcross, Jr., has returned to his post as president and general manager of Cuban Mining Co. at Cristo, Oriente Province, Cuba. He has been on leave of absence to take charge of construction of the mining and metallurgical plants of Nicaro Nickel Co. for Defense Plant Corp. Located on the north coast of Cuba, the mine is now shipping ore, and operations are well under way. Mr. Norcross will continue as vice president and director of Nicaro Nickel. Both companies are subsidiaries of Freeport Sulphur Co.

Henry C. Carlisle, now acting as advisory engineer for the Metals Reserve Co., lately visited Nevada mining districts in connection with this work from his San Francisco office.

Maj. Leverett Davis, manager of Idaho properties of the Callahan Zinc-Lead Co. and developing scheelite claims in Pershing County, Nev., was reported lately to have examined the old Mount Hope zinc-lead-cadmium mine, in Eureka County, Nev., long owned by a U. S.

Steel subsidiary and on which the Bureau of Mines is preparing to conduct deep drilling.

Albert Silver, metallurgist who for many years directed principal milling operations at and near Tonopah, Nev., has moved from that silver camp to Reno, and has been active in other mining centers as a consultant.

Clarence H. Hall, field engineer for the U. S. Vanadium Corp., with headquarters for some time in Nevada, has been in Washington, D. C., in connection with tentative plans of Metals Reserve to establish a tungsten sampling plant near scheelite properties in Humboldt County, Nev., owned by U. S. Vanadium and from which lessees are making substantial production.

Capt. Arthur A. De Melik, mining engineer of New York, has been spending some time in the Robinson or Ely copper district in eastern Nevada.

Edward H. Wisser, consulting geologist, has returned to his office in San Francisco from a professional trip to the Uravan and Rifle areas in Colorado.

Charles L. Gruenig, formerly chief engineer for Red Canyon Mining Co., Solvang, Calif., has been appointed superintendent of the Klau quicksilver mine, operated by H. W. Gould & Co., in San Louis Obispo County about 17 miles west of Paso Robles.

Dr. Lloyd M. Pidgeon, who contributed a vital war service by his development of a successful process for producing metallic magnesium for military uses. (*E.&M.J.*, March, 1942, p. 33, and April, 1942, p. 41) has been appointed professor of metallurgical engineering and head of the department at the University of Toronto. He succeeds **Prof. George A. Guess,** who is retiring. Dr. Pidgeon will conduct further research in the light metals.

D. A. Clark, general superintendent of the Arkansas Ordnance Works, at Jacksonville, Ark., resigned as of Sept. 1. He purposes to take an active part in the development of his bauxite interests. He is succeeded by **J. B. Cumming,** former plant safety director.

W. C. Douglass, for many years manager of Kelowna Exploration Co., Ltd., operating in British Columbia, has been transferred to New York City. He has been succeeded at the Nickel Plate mine by **F. A. McGonigle.**

W. D. Nesbeitt, formerly field engineer for American Cyanamid Co., is now employed as assistant sales manager, and part-time as mining engineer, for Butler Bros., miners of iron ore, with headquarters in Cleveland, Ohio.

George A. Morrison, mining engineer, has returned to his home in Akron, Ohio, after completing his contract with the Columbia Chemical Division of the Pittsburgh Plate Glass Co. at Barberton, Ohio. He sank two shafts, 2,258 and 2,323 ft. deep respectively, and developed a limestone mine for modern mechanized operation.

Alberto J. Terrones, geologist, Mexico City, who was awarded an Inter-American scholarship in economic geology by the Coordinator of Inter-American Affairs, is now at Butte, where he will spend six months with the Anaconda Copper Mining Co. For the preceding six months he was working with the American Metal Co., Ltd.

Howe F. McCrae is now with the Bureau of Mines as district engineer for the states of South Carolina, Georgia, and Florida, with offices at 111 Green St., Gainesville, Ga. He was formerly associated with the Jackling porphyry copper companies for many years prior to going to South America in 1935 for Mauricio Hochschild, Inc.

George A. Guess has retired as professor of metallurgical engineering at the University of Toronto, at which he was the first professor of metallurgy, appointed in 1912. He is succeeded by **Dr. Lloyd M. Pidgeon.**

Thomas A. Wright has been elected president; **John Jicha,** vice president and chemical director; and **Dr. Robert H. Bell,** vice president and research director of Lucius Pitkin, Inc., of Pitkin Bldg., 47 Fulton St., New York, N. Y. The Pitkin Laboratories are in their 58th year of service.

C. E. McLeod, lately resident director of Yukon Consolidated Gold Corp., Ltd., has been appointed secretary-treasurer of the corporation, with headquarters at 1919 Marine Building, Vancouver, B. C.

L. N. Wenerstrom, a mining engineer formerly at Allenby, B. C., is now metallurgist for Tamarack & Custer Consolidated Mining Co., at Wallace, Idaho.

United States Senator James G. Scrugham, of Nevada(on the left), asked as many questions as he answered at his conference in Spokane on Aug. 5 last. He was entertained at a luncheon given him by the Northwest Mining Association. Seated with him is Frank Kuehl of Washington, D. C., RFC counsel in charge of mine loans. They were on a fact-finding tour of the Northwest.

T. H. Wickenden has been appointed manager of the development and research division of the International Nickel Co., with **H. J. French,** as assistant manager. Mr. Wickenden succeeds the late A. J. Wadhams, under whom he had served as assistant manager since 1931. Mr. French is serving temporarily in the Steel Division, WPB, in Washington. He has been in charge of alloy steel developments for International Nickel since 1932.

Sam Tour, who has been director of the Frankford Arsenal Laboratory for the past two years, has resigned from this position to devote his full time to a newly formed company, Sam Tour & Co., Inc., New York. The company will take over the metallurgical and chemical engineering work of Lucius Pitkin, Inc., of which Mr. Tour had been vice president for 14 years. The Pitkin company will continue as consulting chemists and assayers to the mining and metallurgical industries.

OBITUARY

Hal Williams Hardinge, mining and metallurgical engineer and inventor, in whose name more than sixty patents had been issued, most of which are familiar to mining engineers and metallurgists, and chairman of the board of the Hardinge Co., Inc., 122 East 42nd St., New York City, died on Sept. 16 last at his home at Forest Hills, Queens, Long Island, N. Y. He would have reached the age of 88 had he lived until Sept. 30. Mr. Hardinge's passing ended the career of a world citizen whose life had been filled with industrial adventure and conspicuous accomplishment. He was born in San Antonio, Tex. Moving to Brooklyn, N. Y., he left school at the age of 13 to become a printer's apprentice and, later, when living in Buffalo, a "butcher boy" selling papers on New York Central trains. He learned telegraphy and stenography and took special

scientific courses at Philadelphia High School and Franklin Institute. From 1881 to 1883 he studied at the Colorado School of Mines, which he left to prospect for gold near Leadville, Colo. He was later the recipient of an honorary degree of mining engineer from the Colorado school mentioned. Following his studies there, he engaged in professional work, including managing mines and smelters in the West for many years, and investigation of gold, silver, diamond, nickel, and iron mines throughout the world, during which time he devoted his talents constantly to the service of the arts of his profession by invention and improved practices and methods. He served with the U. S. Bureau of Mines as a dollar-a-year-man in the first World War. He was the recipient of many medals and honors, including the James Douglas gold medal, awarded by the A.I.M.E., and the Edward Longstreth and John Scott medals, for his inventions, both awarded by the Franklin Institute, of Philadelphia. Mr. Hardinge continued to work on inventions until his 80th year. He retired from active business and professional life in 1939, when he resigned from the office of president of the Hardinge company. He was a member of the Engineers Club and the Mining Club. Surviving are his widow, Bertha W. Hardinge; a son, Harlowe Hardinge, of York, Pa., and a daughter, Mrs. Arlene H. Greening, of Albany, N. Y. Mr. Hardinge's personality was vital with human, professional, and civic awareness. He wil be remembered with warm regard by all who knew him.

Alfred Stephen Kenyon, for more than 40 years a member of the Australasian Institute of Mining and Metallurgy, and for the greater part of that time honorary treasurer, died recently at Melbourne, aged 75 years. His professional life was spent with the Victorian Water Supply Department. From 1932 until his retirement in 1935, Mr. Kenyon was a commissioner of the State Rivers and Water Supply Commission. In private life he was a noted anthropologist, and an authority on Australian history and numismatology.

G. H. Wilson, 36, mining engineer, who was in charge of development of Takla mercury mine for Bralorne Mines, Ltd., in British Columbia, died of a heart attack recently at Takla Landing, B. C.

J. B. Bell, superintendent of Western Mining Corp., Ltd., and of Gold Mines of Kalgoorlie, Ltd., in Western Australia, died recently at the age of 58.

LETTERS

Denial of Priorities Threatens Export Market For Mining Machinery

The Editor:

IT IS DESIRED to bring to your attention a situation that confronts us and perhaps many other U. S. manufacturers of mining machinery. We shall outline this matter as briefly as possible.

1. Our government has stopped the mining of gold in the U. S. A. (Limitation Order L-208.)

2. Gold mining goes on actively in many parts of the British Empire—Canada, Australia, Union of South Africa, Southern Rhodesia, New Zealand. It must be acknowledged by any thinking person that it is essential to their internal economy.

3. Much American-built mining machinery is in use in the above-mentioned gold-mining areas. It has taken the American manufacturer many years to develop these foreign markets.

4. WPB will not grant priorities either for new machines, or *even for essential repairs* for gold-mining equipment anywhere in the world. (There are a few minor exceptions to this.)

5. Through inability to secure essential repairs for continued operation, American-built machines are gradually being retired from service for the duration, if not permanently.

6. These retired American-built machines are replaced by complete new machines of British, Canadian, South African, etc., manufacture.

7. The consumption of steel and other metals for replacement of complete machines is far greater than would be the consumption of steel required for essential repairs only.

8. It is clearly apparent that the present situation is affording our foreign competitors a golden opportunity to capture from us that part of the gold-mining machinery market abroad which the American manufacturer has developed in past years.

9. Canadian Priority Regulations are now set up to exclude U. S.-made material, and not only for gold mining; e.g., Canadian Priority Order 5, Paragraph 5, "Materials Available in Canada —A United States preference rating may not be used to secure any materials from the United States which are available in Canada within a reasonable period of time."

We submit that there is undoubtedly a high content of U. S. steel and/or iron in all Canadian-made mining machinery, and that British steel used for gold-mining equipment is available only because our generous shipments under Lend-Lease, of both raw materials and finished implements of war, release British steel for other uses less directly related to the war effort.

We further submit that these foreign markets are important to our postwar economy and unemployment problem, and that the difference in the position taken by the U. S. government as opposed to that of the British and Colonial governments toward the gold-mining industry represents unfair discrimination against the American manufacturer and, more important, actually increases the consumption of essential materials.

As an important producer of pneumatic rock drills and other machinery for all classes of mining, producing 100 percent directly or indirectly for war purposes, it is our belief that American manufacturers should be permitted to furnish the relatively small amount of essential repairs for gold mines abroad, to avoid the greater consumption of critical material, U. S. and British, now being used to replace with new equipment the complete machines of U. S. manufacture retired for inability to procure the repair parts necessary to keep them running.

I wonder how many other American manufacturers are confronted with the same problem.

R. H. PEARSON,
Vice President,
Quincy, Ill. Gardner-Denver Co.

Mr. Ickes' Estimate of What the U. S. A. Is Worth

The Editor:

TO THE READERS of a monthly magazine (*American,* August) Harold L. Ickes, who should know better, has recently summed up his idea of "What The U. S. A. Is Worth." Roughly, we are worth "12 trillion dollars in physical assets, with a little odd change amounting to 23 billion dollars left over for tips and other miscellaneous items of expense." Distributing this wealth equally "would give every man, woman, and child in America the tidy sum of $89,000." As creators and inheritors of this vast national wealth "we are every one a Croesus."

Harold, the self-acknowledged curmudgeon, must have drawn his conclusions with tongue in cheek, for he has invited "mathematicians, geologists, bankers, and engineers to sharpen their pencils and try to prove that I am a Baron Munchausen."

For a Munchausen only, this might be amusing, but from Mr. Ickes' office in Washington a failure to distinguish between "assets" and "net worth" can only be ascribed to the fact that Mr. Ickes is selling and not buying. He is selling an idea that our national debt and the total cost of the war compared with the wealth that lies in and on the ground "looks like the Sunday school collection plate of the Swampland Church on a bad day."

In determining "worth" by adding up the assets column of the national ledger, Mr. Ickes fails to list a single liability. Of the 12 trillion dollars, about eleven and one half are based on reserves of coal, iron, and all other minerals. Mr. Ickes blandly ignores the fact that it might cost ninety cents to produce a dollar's worth of coal, f.o.b. the mine collar. The only person to whom this might be of interest is John Doe, who has suddenly found his $89,000 shrunken to $8,900 before taxes.

Like many another promoter Mr. Ickes has overestimated his future profits. These errors were noted several years ago by Hartley Withers, who wrote, "When you are capitalizing a PERHAPS which you believe to be infinite, the number of noughts that you add on to the market value of the company's capital is a matter that does not concern you as long as you are wrought up to the right pitch of excitement."

A. C. HARDING
Osage, Wyoming.

Reflections from Washington

Washington News Bureau

OFFICIALS of the War Production Board have announced with some show of satisfaction that the production curve is going up again. Their satisfaction does not extend to the airplane program, which is still behind schedule, even though a good guess for the total production this year would be in the neighborhood of 90,000.

Material shortages have not delayed plane production recently, for copper, aluminum, magnesium, and steel are in good supply. Carbon steel is tight and will be so until sometime in the fourth quarter, when it is expected that new facilities coming into production will pick up the slack. Other metals, including most of the ferro-alloys, also are easy, and Washington production officials seem satisfied with the raw-material outlook. Were it not for guarantees made by government to support operation of marginal producers, it is conceivable that attempts would now be made to close down the small high-cost operations.

Cadmium is in short supply. The stockpile of lead, viewed in some quarters as more than adequate, is being reduced.

Men or Fathers?

ONE of the greatest difficulties in increasing plane production is manpower, which is the big problem facing all industry now and for the duration. The increasing size of the Army and the increasing demands of industry make the problem more acute. About 450,000 men are needed to reach the year-end goals of the Army and Navy. Selective Service is calling up over 300,000 men per month for the last quarter of the year to supply the necessary number. Fifty-two percent are for replacement and only forty-eight percent represent additions to the net strength of the armed forces. The Army is now approaching the planned limit and future additions will be for maintenance. The Navy, on the other hand, is only about 60 percent manned, and after Jan. 1 most of the men being inducted will go into that service. It will finally reach a total of over 3,000,000 men, or approximately the size of the Army during the first World War.

To provide enough men for the armed forces, drafting of pre-Pearl Harbor fathers will go forward as planned. Congress came back with a great hue and cry over the Wheeler bill to defer the drafting of pre-Pearl Harbor fathers, but when the Selective Service Act was passed in 1940, the order in which men would be called was established, with fathers coming last. There has been no change in that pattern since. The hullabaloo will not prevent drafting of fathers, but it may influence decisions of local boards.

West Coast Plan or Else

ON OCT. 1, WMC announced that critical labor areas had been increased from 59 to 71. These labor shortage areas are largely the result of taking labor to industry instead of bringing industry to labor. A good example of this tactical error is the huge concentration of industry on the West Coast, now one of the areas of severest labor shortage.

The Baruch report on manpower conditions forced the establishment of what is now called the West Coast Plan for distribution of labor in that area. Actually it is the Buffalo Plan, which places control of hiring in the hands of the United States Employment Service. Male labor is referred by the U.S.E.S. to plants according to the position of each one on a secret priority schedule set up by a labor requirements board functioning in each labor shortage area. By this plan men are moved within the labor shortage area to those plants where they are of greatest use in the war effort. Some criticism of this plan has reached Washington. Management dislikes the possibility of contract cancellation if necessary labor is not available in the area. Objections from labor are that they fear rates of pay will be sealed down as men are moved arbitrarily from plant to plant. It may also be possible that labor will be drained out of one industry and one union into another industry and another union. High labor officials in Washington have privately expressed their wholehearted support of the plan, however, and high officials of the War Production Board believe that the possible transfer of contracts will not dislocate industry in any degree.

Tieing into the whole program for relieving the manpower problem in shortage areas was the reissuing of Directive 2, Amended, covering placing of war contracts, by Donald Nelson, chairman of the War Production Board. Present policy is to avoid contracting for all production in areas in which labor shortages are known to exist, and "regardless of any other considerations, no contract requiring increases in employment shall be placed in the West Coast region, or in any other region to which a program similar to the West Coast manpower program may hereafter be applied, without the prior approval of the chairman of the War Production Board. . . ."

Officials agree that the successful application of the plan is all that stands between the country and a national service act, which could be a tremendous political weapon against both labor and management.

Stockpile Bill Revisions

FOLLOWING the many hearings held in Washington and the West on his original stockpile bill (S. 1160), Senator Scrugham brought it back to Washington and went to work on it. The results were evident recently when he presented his revised version of the bill "to stimulate production of strategic and critical minerals for the present war effort and to assure an adequate supply of such minerals for any future emergency by continuance, intact, in the postwar period of all stockpiles surviving the present war and by necessary augmentation thereof primarily from domestic sources, and for other purposes."

Some of the changes include: transfer to Metals Reserve Co. at the end of the war of all existing stockpiles and also all existing contracts for purchase of minerals; the retention of all stockpiles for use in a time of war or under such circumstances as Congress shall regard as a national emergency; construction of reduction plants for Metals Reserve Co. only where adequate private facilities are not, and cannot be made, available; provision for conservation of low-grade ores in mines now possessing facilities for recovering these ores, but which are not doing so because it would be unprofitable at the current market.

The section governing purchase of minerals has been altered the most. Domestic producers are given the greatest consideration, with special attention going to those small or marginal producers whose part in the war effort is their chief justification for operating. During the first year after the war, these mines are given first call in stockpiling minerals, and prices paid will be the highest OPA ceiling price or the highest price that mine received during the war.

For the remaining domestic mines, in the first year and for all domestic mines after that, the prices will be set

equal to the current import price of each metal, after payment of duty, plus 25 percent, the idea being to build the stockpile with American metals, even at an uneconomic cost.

The Stockpile Control Board will certify those mines which will benefit under this plan, and foreign mines may be certified by the Board if it feels that requirements cannot be met by the output of domestic mines. In the original bill, the Bureau of Mines was to act as the certification agency. A further duty of the Board, composed of three leading mining men, and the secretaries of State, War, Navy, and Interior, will be to limit the size of the stockpile to the requirements of a three-year total war. The Board is given full latitude in deciding which minerals should be stockpiled. It will be interesting to see what minerals and how much of each the Board, if it is ever established, will deem necessary to fight a three-year war in 1965.

Senator Scrugham is also working on a bill to deal with the problem of scrap and secondary metals which will accumulate in enormous quantities after the war. Unquestionably this problem, which could have a serious effect on the postwar mining industry, should be dealt with by legislation before the war ends, but the nature of the solution is not easily worked out. In any event, it is unlikely that the vast amount of metals now being made into tanks, guns, and bullets will ever be dumped back onto the open market again as battle scrap was after the last war.

Validity of Placer Claims

CONSIDERATION of S. 1139 is to be taken up actively by the Senate Committee on Public Lands and Surveys in the near future. This word was received from Senator Hatch, chairman of the committee, shortly after Congress reconvened in September. The bill provides for recording of placer claims and determination of a procedure for establishing the legality of many which are in question. (See *E.&M.J.* p. 49, Sept. 1943.)

Senator Hatch, who introduced this bill at the request of the Public Land Office, has received much unjust criticism for certain sections. This criticism should be leveled at the Public Land Office, where the idea originated and where the bill was prepared. Washington critics of S. 1139 have singled out Section 4 of the bill for their most unfavorable comment. The section reads:

"Notwithstanding the filing of any statement required by this Act, the validity or existence of the claim to which such statement relates shall remain open to inquiry and determination upon such procedure as may be prescribed by the Secretary of the Interior, or in any other lawful proceeding."

It has been pointed out to the committee chairman that to grant the Secretary of the Interior power to prescribe a procedure for the determination of the validity of placer claims is both unprecedented and unnecessary. It is a power, say the critics, which should not be given to a Cabinet official under any circumstances, particularly when existing laws give the government the right to institute court action to accomplish that purpose. From the government's viewpoint, the prescribed legal procedure is long and drawn out, and it would be advantageous for the administrator to be able to bypass the legal red tape. Opponents of the proposed measure contend that the very length of the routine that must be followed under existing laws is protection for the individual from arbitrary bureaucratic action.

Senator Hatch explained to the representative of *Engineering and Mining Journal* that he expected to call an early meeting of the Committee on Public Lands and Surveys at which a subcommittee would be set up to study the bill carefully before further action is taken. If the subcommittee holds hearings, the bill may be considerably modified.

Gold Mine Machinery

TRANSFER OF EQUIPMENT from gold mines closed by Order L-208 was made easier by an amendment to that order issued the last day of August. Principal changes in the order are a clarification of the definition of "operation" as applied to gold mines, and the addition to Schedule A of equipment to take the place of equipment listed in P-56, which had been previously used. Only the equipment listed in Schedule A of L-208 is frozen, which removes the freeze on certain minor items originally covered by the order. This will be of great assistance both to gold mine and other operators to whom equipment may be transferred. Disposition of machinery without specific authority of WPB is prevented by the order, except to producers holding serial numbers under orders P-56, P-58, and P-73.

Clearing Up CMP Reg. 5

IN MID-SEPTEMBER a slight revision was made in CMP Regulation 5. It covers purchase of maintenance, repair, and operating supplies in general industries which do not have their own specific orders. The revision deletes the words "mines and quarries" from the schedule of operations entitled to the provisions of the regulation. CMP Regulation 5 supersedes orders of the "P" series for maintenance, repair, and operating supplies, except when specifically provided to the contrary in those orders. Although P-56, the M-R-O order for the mining industry, was thus exempted from CMP Regulation 5, the continued inclusion of mining and quarrying in requests under Schedule 1 of Regulation 5 was a source of conflict and confusion. Why CMP Regulation 5 included reference in the first place to an industry which the order's own provisions exempted from its control is one of those things which it is better not to attempt to understand.

Advice to Mica Miners

EARLY IN SEPTEMBER mica miners received a report on the domestic mica testing program. This was set up to determine whether types of mica heretofore considered unsuitable for use in condensers might prove to have acceptable qualities. The results of these tests indicate the reliability of instrument testing for electrical qualities. The September letter to the industry signed by S. A. Montague, chief of the Mica Section, suggested that results of the tests might make changes in the buying policy of the government agencies advisable. The implication is that purchasing agents might find it impossible to justify buying under the present price scale from mines which consistently produced mica of poor electrical quality.

Mica miners should also take heed to the policy laid down in the distribution of the miners recently released from the Army to work in the copper, zinc, and molybdenum mines of the West. These men were placed where the most metal per man per month could be produced. The same policy will hold true in the future for placing men and equipment in mica mines. In the latter there will be the additional requirement that the mica must have the proper physical and electrical characteristics.

Labor and Management

REPORTS of the success of the labor-management committees continue to reach Washington, and WPB officials in charge of the drive to establish L-M committees in the non-ferrous metal field are enthusiastic. Work of the committees, they explained, can be classed as preventive medicine, which does not necessarily show up as an increase in tonnage at the end of the month. They believe that the answer to the question, "What would conditions be like if the committee had not been functioning?" is the only sound basis for judging results.

Greatest successes have occurred where the representatives of management have had the power to act on employees' suggestions that do not involve large expenditures or changes in company policy. Minor changes that have been made promptly have proved to be excellent morale builders.

Washington officials believe the long-term benefit is the habit being formed by labor and management of getting together to work out solutions for pro-

(*Continued on page* 104)

NEWS OF THE INDUSTRY

SEC Survey Shows Mining Profits Not Excessive

NET PROFITS retained by mining and smelting companies in 1941 were close to the average of business concerns in general, according to a survey made recently by the SEC for various government agencies studying the problems of renegotiation of war contracts. The survey included 864 companies in 59 industrial groups, and among them were 23 non-ferrous mining and smelting companies. Final net profits of each were recorded as a percentage of invested capital, and corporate income taxes were also tabulated.

The mining group had an average net profit just about equal to that of the whole group average. Total invested capital of the 864 companies was $29,000,000,000 and profit for 1941 amounted to 9.91 percent of this. For the mining group, capital investment was $2,019,129,000, and net profit was 10.20 percent, 0.29 percent above the average.

In 1936 the mining group paid income taxes of about 14 percent of its net profit before taxes. Profits that year were $173,683,000. In 1941 profits were $356,470,000, almost exactly twice as much, but income taxes were $148,147,000, or 42 percent of profit, about six times the 1936 taxes.

The following table shows the SEC figures for invested capital, final net profit for 1941, and profit as a percent of capital for 1941, 1939, and 1936. Dollar figures are in thousands; the figure in parentheses indicates a deficit.

Name of Company	Invested Capital 1941	Final Net Profit 1941	Final Net Profit as a Percent of Capital in 1941	1939	1936
Amer. Metal Co.	$56,526	$3,135	5.55	5.43	3.24
Amer. Smelt. & Ref.	121,333	15,743	12.98	10.74	14.10
Amer. Zinc, Lead & Smelt.	9,087	767	8.44	4.13	.68
Anaconda Copper	571,687	43,434	7.60	3.59	2.81
Andes Copper Mining	88,069	4,324	4.91	3.03	.98
Calumet & Hecla Copper	31,941	1,169	3.66	1.90	2.37
Cerro de Pasco Copper	37,401	2,433	6.51	6.55	9.59
Chile Copper	139,659	16,761	12.00	7.59	3.79
Climax Molybdenum	74,566	8,954	12.01	13.21	6.62
Copper Range	12,443	1,098	8.82	4.19	3.37
Eagle-Picher Lead	19,300	1,424	8.05	5.92	5.97
Hudson Bay Mining & Smelt.	39,621	6,993	17.65	13.92	10.77
Illinois Zinc	1,266	396	31.28	(16.64)	2.02
International Nickel	225,553	34,356	15.23	16.92	17.65
Kennecott Copper	369,339	49,252	13.34	9.99	7.90
Magma Copper	9,123	1,492	16.35	16.25	16.41
Molybdenum Corporation	4,579	511	11.16	11.47	1.42
National Lead	89,752	5,376	5.99	6.72	8.74
Phelps Dodge	179,642	14,207	7.91	6.76	6.78
Reynolds Metals	49,810	2,868	5.76	7.26	11.17
St. Joseph Lead	31,145	4,893	15.71	17.97	8.55
U. S. Smelt., Ref., & Mining	59,824	4,916	8.22	8.56	9.06
Vanadium Corporation	15,654	1,232	7.87	8.51	1.12

A. S. & R. Chairman Holds Brief for Bimetallism

TO ASSURE an adequate supply of monetary metals for the postwar period, Francis H. Brownell, chairman of American Smelting & Refining Co., recently urged adoption of international bimetallism by the leading commercial nations of the world. In a published statement, Mr. Brownell took the view that such a program would have all the advantages of present systems based on gold, and would in addition supply needs of countries with currencies based on silver.

Mr. Brownell stated that about 70 percent of the world's gold is now held by the United States, and that "obviously the $8,000,000,000 or so of monetary gold owned outside the United States is very far from adequate to permit the other nations of the world to return to any type of workable gold standard." He went on to list what, in his opinion, were the advantages of a system of international monetary standards based on both silver and gold.

Mercury Supply Permits Increased Use of Metal

THE CONSERVATION ORDER governing use of quicksilver was amended by the WPB on Sept 9 to permit increased quantities of the metal to enter production of various mercurials, as well as of thermometers and other essential instruments. Modification of the limitation order resulted from what is officially described as "an appreciable easing in the domestic supply of mercury, due to increased production, completion of Russian requirements, and a safe stockpile."

Conservation Order M-78, as amended, removes from the prohibited items on "List A" preparations for developing films, treating green lumber, wood preservation, manufacture of vermillion, marine anti-fouling paint, manufacture of wall switches, and thermometers. These items have been placed on "List B," which restricts the allowable use of the metal to certain percentages of base period totals.

Unrestricted use of quicksilver and its derivatives is permitted under the amended order for agricultural uses, health supplies, and safety and technical equipment. These items were formerly on "List B."

Other items on "List B," such as fulminate of mercury for blasting caps, and mercury for use in industrial and scientific thermometers, have been classified as products on which consumption of the metal may be increased to 200 percent of the base period.

"List A" in the amended order still prohibits use of mercury in carroting fur for hats, for use in fireworks, and in turf fungicides.

United States and Brazil Plan Educational Project

ADVANCED PRACTICES in the science of metallurgy in the United States will be communicated to Brazilian industrialists during the coming year through a technical educational project established at the Escola Politecnica of the University of Sao Paulo, one of Brazil's leading technical schools. Four leading United States scientist-educators will give a series of lectures on metallurgy at the Brazilian school, each to remain in residence there for three months.

Jointly financed by the Escola Politecnica and the Rockefeller Committee, the program will be administered by Stevens Institute of Technology, Hoboken, N. J. The first lecturer is Dr. A. Allan Bates, manager of the chemical and metallurgical departments of the Westinghouse research laboratories. He will be followed by: Dr. Robert F. Mehl, professor of metallurgical engineering at Carnegie Institute; Professor Arthur Phillips, of the Hammond Metallurgical Laboratory, Yale; and Professor Gregory Comstock, director of the Stevens Institute powder metallurgy laboratory.

E.&M.J. Index, 1943

DO YOU WANT AN INDEX to the current volume of *E.&M.J.*? If so, please make a direct request to the Editor. Ordinarily the annual index is bound in the December issue and distributed to all subscribers; unfortunately that is not feasible this year under the restrictions on the use of paper imposed by the WPB. Nevertheless, the publisher wants to send an index to every subscriber who needs one; therefore, your prompt cooperation will insure the printing of an adequate supply and your own receipt of an index.

WPB Simplifies Handling of Application Forms

THOUSANDS of application forms formerly routed to the WPB in Washington will now be processed in the field, according to a recent announcement by H. G. Batcheller, operations vice chairman. Field offices will have increased powers to handle PD-1A applications, industrial projects under $10,000, emergency assistance applications (PD-333), and appeals under WPB orders.

Simultaneously Mr. Batcheller announced a reduction in CMP paper work which will have the result, after the

first quarter of 1944, of eliminating two out of every three CMP 4-B quarterly applications. This will be accomplished by making as many authorizations as possible on an annual basis.

Copper Supply Now Balances Needs

SEVERAL FAVORABLE factors have combined in recent months to bring about a rough balance between supply of copper and its actual consumption by the United Nations, according to an announcement of the Combined Copper Committee.

The present favorable position is said to be due to reduction of sinkings of ships carrying ore or copper products, increased supply of copper scrap, faster shipments between Africa and the United Kingdom, and a reduction in demand because of increased substitution of steel for copper in ammunition manufacture.

The chief difficulty now facing the industry is said to be a shortage of manpower in the brass mills of the Connecticut Valley. The War Manpower Commission is now at work on the problem.

The Combined Copper Committee is made up of representatives of appropriate agencies of the United States, Canada, and the United Kingdom.

Ferrous Iron Penalty Slows Bauxite Output

ARKANSAS' BAUXITE MINERS were thrown into a near-panic recently by the announcement that all new Metals Reserve Co. bauxite ore contracts contained a clause applying a penalty of $0.43 per ton for each percent of ferrous iron in the ore above 6 percent. Because most of the ores mined by independents in Arkansas contain more than 6 percent ferrous iron, the penalty would make it difficult for these smaller miners to carry on operations.

Reason for the penalty was said to be the difficulty of handling ores high in ferrous iron in alumina plants. It was reported that after dissolution of the alumina in the process used, ferrous iron formed a precipitate which could not be settled out except by slowing down the process prohibitively, and which resulted eventually in clogged filter cloths.

Homer M. Adkins, Governor of Arkansas, is attempting to work out with government officials some modification of the order, or a new arrangement, which will protect against loss those miners who have already spent considerable sums in development work on bauxite deposits now regarded as unsuitable under the new penalty. Joe W. Kimzey, Arkansas State Geologist, suggested the establishment of a government-operated stockpile wherein high-ferrous iron ores could be blended with low-ferrous ores to supply an acceptable product to aluminum plants and still allow small producers to continue mining.

It was reported that Republic Mining & Mfg. Co., ALCOA subsidiary, was refusing to accept further shipments of ore from the Berger stockpile, near Little Rock. Operators said the pile contained about 750,000 tons of bauxite ore which had cost the government about $3,000,000. A few days later it was announced that mining at Republic's own pits in Saline County will be cut 65 percent for the next six months by WPB order. Republic said the cut had been ordered because ore production exceeded WPB's supply quota for the Hurricane Creek alumina plant, also operated by ALCOA.

Increased Development for North Carolina's Mica

AS A PART of a program designed to increase productivity of North Carolina's mica mines, tests are under way in several laboratories to determine suitability of various grades of mica for use in radio condensers of new types. E. H. Dawson and O. M. Phelps, of the Mica-Graphite division of the WPB, are conducting experiments at Asheville to that end; and E. L. Hall, of the Bureau of Standards in Washington, is attempting to develop a simple method of testing mica for condenser use. It has been found that stained mica may be suitable for condensers under certain conditions, and on the other hand many samples of clear mica have been found unsuitable. The best indicator thus far found is the power factor of the mica sample, and visual inspection is not satisfactory as a means of determining this quality.

To aid in increasing mica production, Colonial Mica Corp., whose laboratory facilities are being used by the WPB investigators named above, announced recently a plan to lease mining equipment at a nominal charge to any mine operator of the district not otherwise able to obtain it. A large stock of air compressors, drills, pumps, hoists, and other equipment is available, and advice on mining and production problems will also be given.

J. A. Terry, mining engineer of Catawba Mining Co., Newton, N. C., recently reported discovery of one of the largest blocks of mica ever mined in the Carolinas. The block was 18 by 34 by 3 in. in size, and weighed 600 lb. The company was incorporated recently by John H. Booth, N. H. Sigmon, and R. Hoyle Smathers, to take over the assets and operations of the B. & S. Mining Co. in Lincoln, Catawba, Cleveland, and Wilkes counties in North Carolina.

Anaconda Copper Enters Light-Metal Industry

AT THE REQUEST of the WPB, Anaconda Copper Mining Co. will construct and operate a plant for the extrusion of aluminum and magnesium shapes. The plant is to be operated by Anaconda Alloys Corp., and is to be erected near Columbus, Neb., at a cost of approximately $10,000,000. About 650,000 sq.ft. of floor space will be provided for the production of rods, bars, tubes, and other shapes of aluminum and magnesium.

Arizona Group Suggests Aid for Small Miners

THE YAVAPAI COUNTY COUNCIL of the Arizona Small Mine Operators Association at its August meeting in Prescott, Ariz., adopted a resolution in which the group expressed its fear of "a movement under way to close down all small mines," and suggested that such mines be encouraged rather than hindered in their production of metal.

The Council's resolution voiced the belief that but little labor or materials would be released to large mines by closing small ones, and that any increased metal output which would result from such action would not be as great as the current production of the small mines themselves. The resolution also suggested the simplification and liberalization of procedures for obtaining mineral loans, premium prices, and other aids to production. Copies of the document were sent to the several government agencies dealing with mineral production.

Canada's Metal Exports Largest in World

CANADA'S EXPORTS of base metals are now greater than those of any other country in the world, and this year metal output will attain the highest peak in Canadian history, C. D. Howe, minister of munitions and supply, reported to the House of Commons recently. Mr. Howe attributed Canada's metal export leadership to her enormous aluminum industry expansion, to development of a new process for magnesium, to increased recoveries at large base-metal mines, and to revival of old mines and exploitation of new ones.

Canada's aluminum output, for example, is now six times that of 1939, and is, in fact, greater than total 1939 production of the rest of the world. About 40 percent of the war requirements of aluminum of the United Nations now comes from Canada.

With regard to other metals, Canada now produces 95 percent of the nickel output of the United Nations, 20 percent of the zinc output, 12½ percent of the copper, 15 percent of the lead, and 20 percent of the mercury. Mr. Howe had the following to say on Canada's supplies of tungsten, molybdenum, and mercury:

"We have discovered what appears to be one of the most important discoveries of tungsten on this continent. In the latter half of 1943, Canada should be well on the way to self-sufficiency in tungsten.

"The search for molybdenum has met with considerable success. Two new properties, one financed by the government, will be in operation in the latter half of this year, and their combined output should provide the major part of our requirements.

"The development of mercury has been outstanding. Prior to the war, we were entirely dependent on imported supplies, but today Canada is one of the important producing countries of the world, and we are exporting in quantity."

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OUT OF THIS NETTLE, DANGER. *By Harold W. Dodds. Princeton University Press, Princeton, N. J. Pp. 57. Price $1.*

SUBTITLE to this volume is "Essays for the Post-War Era." The author is president of Princeton University, and his essays are written as a much-needed corrective to counsels of pessimism and despair regarding the postwar world. Mr. Dodds believes that America can enter the brightest period of its history "if we will it hard enough." The result is a stimulating and thought-provoking little volume that will repay reading. The title is part of a quotation from Henry IV, "Out of this nettle, danger, we pluck this flower, safety."

ENCYCLOPEDIA OF SUBSTITUTES AND SYNTHETICS. *Edited by Morris D. Schoengold. Published by Philosophical Library, Inc., New York. Pp. 382. Price $10.*

WITH the collaboration of leading scientific and industrial laboratories in the United States, the author has compiled a useful alphabetical list of thousands of raw materials, chemicals, metals, and synthetics that have gained prominence during the war. Some of the products have been developed recently to replace critical and strategic materials difficult or impossible to obtain. The book contains also a list of organizations that have lent assistance in preparation of the volume, and index of trade names, and a subject index.

MANUAL OF INDUSTRIAL HYGIENE AND MEDICAL SERVICE IN WAR INDUSTRIES. *By sixteen authors including W. M. Gafafer, Editor, published by W. B. Sanders Co., Philadelphia and London. Pp. 508. Price $3.00.*

AUTHORITATIVE, comprehensive, and timely, this book came about through the evident need for a compact volume embracing under one cover the essence of existing knowledge and good practice in the field of industrial hygiene and medical service, otherwise available only in a voluminous literature. The war situation has created new problems for industrial physicians, hygienists, and other professional workers, and expanded needs have drawn many whose previous activity was in other fields. This manual should be useful to both groups. Parts which seem elementary to those familiar with a particular section nevertheless are essential to the general purpose.

The National Research Council is credited with sponsoring the book initially, its Committee on Industrial Medicine having recommended that the Division of Industrial Hygiene of the National Institute of Health—the research branch of the U. S. Public Health Service—be assigned to prepare it. Of the 16 authors, including the editor, who is Senior Statistician of the U.S.P.H.S., 15 are connected with the Health Service and one is with Metropolitan Life Insurance Co.

The book is divided into three parts: Part I, eight chapters, deals with "Organization and Operation of Facilities" (for medical, dental, and emergency services, industrial hygiene); Part II, thirteen chapters, deals with "Prevention and Control of Disease in Industry" (occupational, respitory, and venereal disease, dermatoses, air contamination, mental ills, fatigue, nutrition, health education, etc.); and Part III, three chapters, deals with "The Manpower Problem" (maximum utilization of manpower, women in industry, and absenteeism).

An excellent job is done of presenting in convenient form information as to methods and facilities applicable to management's task of getting the best out of available employee material, and at the same time enhancing the welfare of workers in their industrial community.

THE MINING LAWS OF MEXICO. In English. *Published by "The Mineral Survey" (P. C. Escalante, publisher), 58 Avenida 16 de Setiembre, Mexico, D.F. Pp. 211. Price $1.*

THIS IS A HANDY COMPILATION, 4¾ by 6⅝ in. in size, that will be useful to English-speaking engineers and mine operators engaged in Mexico or elsewhere who find it necessary at times to have specific and accurate information about the Mining Law and Regulations in Mexico, as well as about the other miscellaneous laws, regulations, rulings, and decrees that bear on the mining industry in that country. In addition to the text of the Mining Law and Regulations as such, the volume includes the text of the mining police and safety regulations; regulation for prevention of accidents; instructions to applicants for mining claims and prospecting concessions; tariff of fees payable to mining agents and for registration in mining register; rulings pertaining to mining reserves; the mining tax law; the stamp tax law, and other enactments and promulgations.

MINERAL RESOURCES OF AFRICA. *By A. Williams Postel. University of Pennsylvania Press, Philadelphia, Pa. Pp. 105. Price $1.50.*

IN SURVEYING the mineral resources of Africa, that continent offers no exception to the general rule that each grand land division of the world is self-sufficient in some raw minerals and deficient in others. Thus, according to the author, Africa leads the world in production of diamonds, gold, phosphates, and radium ores. She is a large producer of copper, chromium, manganese, and vanadium, and has large potential reserves of aluminum ore. On the other hand, her coal deposits are small and her petroleum resources practically nil. Her lead and zinc deposits are inadequate.

The author's treatment of the subject gives the reader a clear picture of Africa's position, in relation to the world situation, in the ferrous, nonferrous, minor, and precious metals and in the non-metallics. To the extent of available data, he gives figures on production, consumption, reserves, and exports. Imports into the United States are given for important commodities. Minerals not mentioned in the text have not been found or mined on the African continent. The volume is a useful addition to the handbook literature of the world's mineral resources.

PUBLICATIONS

RECEIVED

Occurrence and Production of Vanadium. By George O. Argall, Jr. Colorado School of Mines Quarterly, Vol. 28, No. 4, Golden, Colo. Price, $1.

Study of Tuberculosis. Annual Report of the Saranac Laboratory of the Edward L. Trudeau Foundation, 1942. Saranac Lake, N. Y. Notes on current research relating to silicosis and other respiratory diseases caused by industrial dusts; also aluminum therapy. Abstracts of scientific publication by the laboratory staff on industrial dusts and fumes.

The Price Control and Subsidy Program in Canada. By Jules Backman. The Brookings Institution, Washington, D. C. Pp. 68. Price 50c.

Studies in Arc Welding—Design, Manufacture, and Construction. The James F. Lincoln Arc Welding Foundation, Cleveland, Ohio. Pp. 1295. Price postpaid, $1.50 in the United States, $2 elsewhere.

California. Division of Mines, Ferry Bldg., San Francisco. Bull. No. 122, California Mineral Production and Directory of Mineral Producers for 1941.

British Columbia. Annual Report of the Minister of Mines for the Year 1942. Address the Deputy Minister of Mines, Victoria, B. C., Canada.

Illinois. State Geological Survey, Urbana. Illinois Mineral Industry in 1941. Report of Investigations No. 87. Statistical summary and economic review. Price 25c.

U. S. GEOLOGICAL SURVEY

Westall Mica Mine, Yancey County, N. C. Geologic map. Apply to The Director, U.S.G.S., Washington, 25, D. C.

Tolley Bent Mica Mine, Yancey County, N. C. Geologic map. Apply to The Director, U.S.G.S., Washington, 25, D. C.

Rough Diamond Crystal Mine and Calaveras Crystal Mine, Calaveras County, Calif. Geologic map. Apply to The Director, U.S.G.S., Washington, 25, D. C.

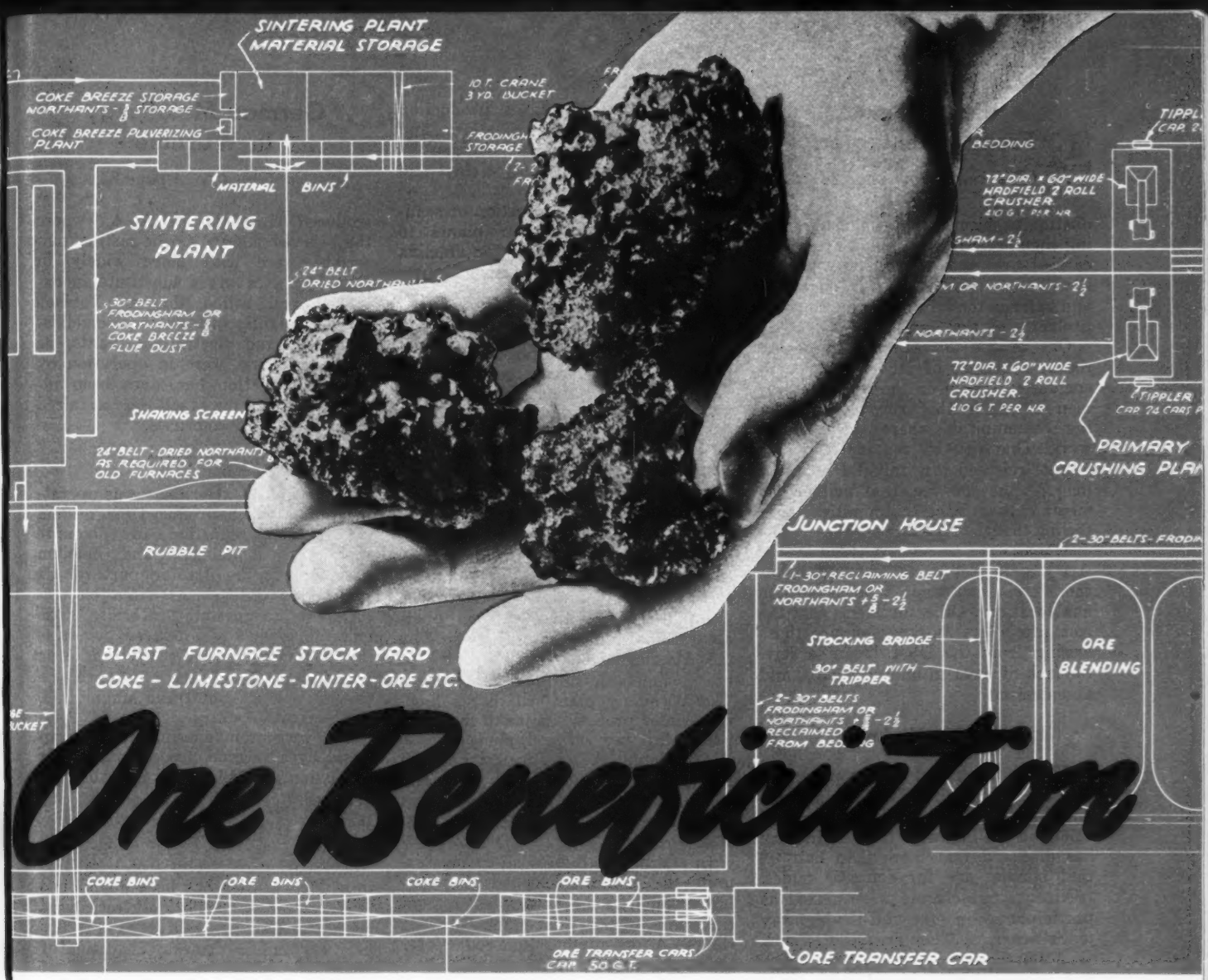
Bull. 935-C. Tin Deposits of Republic of Mexico. For sale by the Supt. of Documents, Washington, D. C. Price 40c.

Bull. 936-N. Antimony Deposits of Stampede Creek Area, Kantishna District, Alaska. For sale by the Supt. of Documents, Washington, D. C. Price 25c.

Bull. 940-A. The Rose Creek Tungsten Mine, Pershing County, Nev. For sale by the Supt. of Documents, Washington, D. C. Price 30c.

Professional Paper 197-C. Lower Pennsylvania Species of Mariopteris, Eremopteris Diplothmema, and Aneimites from the Appalachian Region. For sale by the Supt. of Documents, Washington, D. C. Price 20c.

Professional Paper 200. Geology and Ore Deposits of the Magdalena Mining District, New Mexico. For sale by the Supt. of Documents, Washington, D. C. Price $2.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Reflections From Washington

(*Continued from page* 98)

duction problems. If the habit of working together without animosity can be carried over into the postwar period, it will mean much to both management and labor in the solution of the common problems of that era.

One of the most important of the recent functions of labor-management committees has been the welcoming of men released by the Army into the mining communities where they are to work. One of the reasons why the miners released last fall did not stay long on the job was that neither the men nor the mining communities had a feeling that they belonged together. The men that were recently released by the Army were met by labor-management committees and made welcome at the new locations. Other problems that the committees are working on are those arising from the labor freeze orders, the lack of meat in mining camps, and absenteeism.

Off the Highway

INITIAL truck and trailer programs for the first half of 1944 included authorization for the production of 1,500 off-the-highway trucks. Inquiry has disclosed that more than half of that number are for domestic mines.

Nine manufacturers were named as participants in the off-the-highway truck program. They are: Dart Truck Co., 100; Euclid Road Machinery Co., 487; Four Wheel Drive Auto Co., 117; Koehring Co., 59; Linn Mfg. Co., 55; Mack Mfg. Co., 257; Oshkosh Motor Truck Inc., 117; Peterbilt Motors Co., 203; Sterling Motor Truck Co., 105.

The entire truck-building program will permit production of 22,859 medium and 10,993 heavy trucks, and 14,067 trailers. If conditions in regard to components improve, additions will be made.

Bureau Aluminum Program

THE BUREAU OF MINES expects to continue its exploration and research program for the production of alumina with funds appropriated for the fiscal year which began July 1. The Bureau has summarized its plans as follows:

1. To find by intensive exploration all domestic bauxite which can be used in Bayer plants.

2. To study all means of rendering domestic bauxite or clay deposits suitable for Bayer-plant feed by either physical or chemical beneficiation.

3. To study all means of producing metallurgical-grade alumina from clays, alunites, and feldspathic materials, particularly in the West.

4. To study the direct production of aluminum-iron-silicon alloys and abrasive or metallurgical alumina by electric-furnace treatment of clays and low-grade bauxites.

5. To urge the construction of semi-commercial demonstration plants to prove any new processes for alumina recovery which have had adequate pilot-plant demonstration.

The Bureau plans to give special attention to the use of lime-soda-sinter processing of aluminiferous materials other than Bayer plant red muds.

Two units in the extensive program of semi-commercial plants which have been approved by the Mineral Resources Operating Committee of the War Production Board are of the alkaline-sinter type and are expected to furnish data on utilization of low-grade aluminiferous materials, and on the production of cement as a by-product. These plants are to be located in South Carolina and Wyoming. The South Carolina plant will be operated for Defense Plant Corp. by the American Nepheline Co. and will use a lime-soda-sinter leach process. The Wyoming plant will use a lime-soda-sinter process similar to that proposed for use on red muds at the Alcoa plants. As raw material it will use anorthosite and various clays and will be operated for Defense Plant Corp. by the Monolith Portland Midwest Co.

In addition to these semi-commercial units the Mineral Resources Operating Committee has approved a continuation of the pilot-plant work of the TVA on another lime-soda-sinter leach process.

Because of the need for a trained crew to iron out operating difficulties that will be encountered in starting up commercial alkaline process plants, and because of the extensive work still required to define reactions, determine limits of control, etc., the Bureau will carry on with research at its College Park pilot plant. The information obtained and the assistance of the technical crew will be available at all times to the public.

To complement the lime-soda-sinter process as an adjunct to the Bayer plants, the Bureau will continue and enlarge its studies to provide high-grade feed for Bayer plants from domestic sources. In its program for the fiscal year begun July 1 the Bureau intends to study both the partial removal of iron to produce Bayer feed from bauxitic clays and its complete removal as recommended by Miller to produce metallurgical grade alumina directly. This work will be done in the Rolla, Mo., pilot plant and laboratory.

Work for the fiscal year begun July 1 will also seek to solve engineering problems involved in making the ammonium sulphate-bake process a success.

German Metallurgy In Wartime

(*Continued from page* 83)

troduced from the U. S. A., where they served mainly as die-casting materials, were used more widely in Germany as a brass substitute in extruded and rolled shapes. Various thermal plants, such as the Berzelius-Duisberg, and electrolytic plants, as the Magdeburg, were in operation by 1936. Production has since been increased with the facilities acquired from conquered countries.

Magnesium

Early in 1939, Germany was operating plants which produced magnesium by thermal reduction of dolomite with carbon, silicon, and calcium carbide, but the greater part of its production still comes from electrolysis of magnesium chloride. The chloride is usually produced by reacting magnesium oxide with chlorine and carbon in an electric furnace, the process now used at Basic Magnesium, Inc., in this country.

Recovery of magnesium from scrap metal by a vacuum process was under discussion in 1940, but is probably not yet used.

Rare Metals

The fusion electrolysis of beryllium in a fluoride bath has been abandoned in favor of the chloride electrolysis, mainly because of health hazard. Copper beryllium is made by reduction of BeO with carbon in the presence of copper in a high frequency furnace.

Thorium is produced by reducing ThO_2 with calcium in a sealed pot using $CaCl_2$ as a flux. Thorium, cerium, and calcium are used as additions to nichrome, for they have been found to increase the life of the wire. Zirconium is made in the same way and indium and gallium are extracted from zinc dust. Rhenium, extracted from Mansfield furnace pigs, is on the market. Barium production, by vacuum reduction with aluminum of BaO, started in 1938. Lithium is produced by the Deutsche Gold und Silber Scheideanstalt, probably in plain Downs cells.

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[2] C. L. Mantell and C. H. Hardy. Trans. Amer. Electrochem. Soc., LXVI, pp. 81–83. 1934.

[3] J. O. Betterson. U. S. Patent 1,941,534 and 1,941,535. W. Kroll, U. S. Patent 1,707,059; D. R. P. 381,577.

[4] Blum. Stahl und Eisen, 35, pp. 14–18. 1915.

[5] A. Harr. Stahl und Eisen, 42, pp. 1153–1154. Oct. 1939.

[6] H. Zieler. Stahl und Eisen, No. 28, pp. 749–756. July, 1938.

[7] Thyssen. German Patent, aT45,007.

[8] Körber. Stahl und Eisen, No. 15, pp. 438. 1936.

[9] W. Tillmann. Stahl und Eisen, No. 22, pp. 469–474. 1940.

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Hoefling Bros. Increase Placer Scheelite Output

Reopened Penn mine ready to produce copper and zinc—Wage increase at U. S. Vanadium—U.S.B.M. drills at New Almaden

▶ Operations are proceeding satisfactorily, and production of scheelite is increasing at the Spud Patch placer, in the Atolia district of San Bernardino County, operated by Hoefling Brothers, of Sacramento. The scheelite-bearing channels are worked by open-pit methods, two draglines with 2-yd. and 1½-yd. buckets being used for stripping overburden and mining the paystreak proper. Haulage of ore to the washing plant about four miles distant is done with 20-yd. trucks. Mining operations are carried on in two 10-hr. shifts, and from 1,600 to 1,800 yd. of material is moved daily, of which about 700 yd. is pay gravel. At the mill, the material is disintegrated, washed, and sized in a large revolving trommel, and the resultant undersizes treated in a battery of mechanical jigs. Hutch material is sent to a small gold and byproduct recovery plant containing a dewatering cone, Ainlay bowl, mechanical jig, and a concentrating table. The finished product is exceptionally pure, as is indicated in the following analysis: WO_3, 66.41 percent; tin, trace; arsenic, trace; sulphur, 0.03 percent; copper, 0.01 percent; phosphorous. 0.01 percent; antimony, trace; molybdenum. trace; manganese, 0.06 percent; bismuth, trace, and lead, none. Operations are directed by Allan E. Jones, manager, who is assisted by Henry S. Bates, mining engineer, J. H. Frasher, mine superintendent, and Milo Horner, mill foreman.

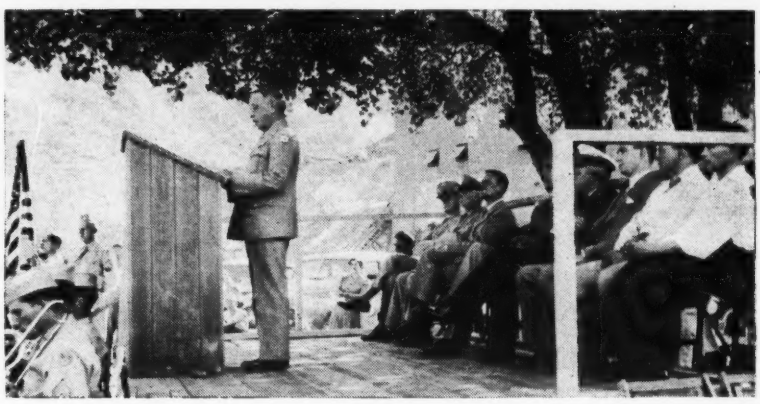
▶ Rehabilitation work has been completed and production is scheduled to begin shortly at the Penn copper mine, in the Campo Seco district of Calaveras County, reopened recently by Los Angeles interests headed by H. G. Miller and G. W. Clemson. The property in years past was worked by Penn Chemical Co., operations being centered in the recovery of copper, with zinc values slagged off in the smelter. Current plans call for production of about 150 tons of copper-zinc ore a day for trucking to the Eagle Shawmut mill, operated by the company near Chinese Camp, Tuolumne County. D. C. Peacock, general superintendent, is in charge of operations.

▶ Core-drilling operations are in progress at the New Almaden quicksilver mine, in Santa Clara county. The work is carried out under the direction of the U. S. Bureau of Mines. The property, once the premier quicksilver producer on the North American continent, is operated by New Almaden Corp., with C. N. Schuette, general manager, in charge.

▶ If the application for funds made by McLaughlin and Applegarth. San Francisco mine operators, is acted upon favorably by RFC, a chrome concentrator will be installed near Red Bluff, Tehama County, to handle ore available in the western part of the county. The operators have under lease the Kleinsorge property, about 32 miles southwest of Red Bluff, and a substantial tonnage of chromite has been developed and shipped during the year. Work is in progress to extend and improve access roads to other chrome holdings in the area in preparation for increased development and production.

▶ A general wage increase of 50c. a day for employees of United States Vanadium Corp. at Bishop, Inyo County, retroactive to April 10, has been ordered by the Non-ferrous Metals Commission of WLB. The order was issued following two disputes involving the Metal Mine Workers Industrial Union, I. W. W., and the International Union of Operating Engineers, A. F. of L.. and became final on Sept. 1, 1943. J. R. Van Fleet is vice president of the company.

▶ A quicksilver treatment plant is in course of installation at the property of Quicksilver, Inc., a subsidiary of Nevada Scheelite, Inc., controlled by Oscar L. Mills and associates, near Bodie, Mono County. Most of the equipment was bought from the Castle Peak quicksilver mine near Virginia City. Nev.



The Army-Navy "E" was given to New Idria Quicksilver Co., New Idria, Calif., Aug. 25, 1943. Presentation was made by Brig. Gen. Warren T. Hannum of the Army Engineers. The award was received by C. Hyde Lewis, general superintendent of New Idria, and George Rodriguez, president of Local 21,966 of Quicksilver Workers Union

ARIZONA

Two Cedar Valley Mines To Be Reopened Soon

Boriana property ready to operate—Oatman magnesite claims explored—U.S.B.M. drilling in Chloride district

▶ After a four months' development program on the 700 and 800 levels, the Boriana mine of Molybdenum Corp. of America is about ready to begin production of tungsten and copper concentrates. The property is near Yucca, in Mohave County. Capacity of the Boriana mill was recently enlarged to 200 tons. Tungsten concentrates will be shipped to the company's plant at Washington, Pa., and copper concentrates will go to the Magma Copper Co. smelter at Superior. W. H. Munds is resident manager of the Boriana.

▶ The old Woolery property near Charleston has been purchased by B. X. Dawson, of Tombstone. The property is being equipped with necessary machinery for immediate production of lead-zinc ores and concentrates.

▶ Copper World mine, property of Phelps Dodge Corp., 15 miles east of Yucca, in the Cedar Valley mining district, is to be operated by Dye and Bathrick, of Kingman. Another Phelps Dodge Corp. property in the Cedar Valley district, the old Antler mine, is being reopened by Vukoye Brothers, of Kingman, who have a lease and option on the property. The ore contains copper and zinc, but occurs in two distinct streaks which can be mined separately. The copper sulphide is found at the hanging wall, and the zinc sulphide is on the footwall. During the first World War a consderable amount of dump material was shipped for its copper content.

▶ The old Binghampton, near Stoddard, on the Agua Fria River in Yavapai County, has been acquired by Mark Gemmil, W. J. Henson, and V. A. Hale, who are preparing to reopen the property to mine a considerable body of copper ore in the back of an old stope. The property was acquired through tax sale by V. A. Hale, Prescott.

▶ Mica Giant mine, owned by T. Mac Smith, of Kingman, is now in operation. The property is in Cottonwood Canyon about two miles from the Gold King mine, in the Hualapai Mountains. E. P. Crawford, of Saratoga, Calif., is leasing the property and will ship the product to Colonial Mica Corp.

▶ Bob Martin, owner, and H. F. Feather, of Pasadena, Calif., are developing the White House magnesite claims on Silver Creek near Oatman. A diamond-drilling program has been in progress to determine the extent of mineralization on these claims.

▶ Kaibab mine, at Jacob Lake in Co-

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▶ARIZONA

conino County, has been leased to H. W. Patterson, of Buffalo, N. Y., by the owners, U. S. Metals Corp. P. J. Barnes, Los Angeles, Calif., is president.

▶ Dan Mayne and Howard Mottier, of Duncan, are operating the Ash Peak mine at the rate of 40 cars per month which go to the International smelter at Miami.

▶ Scheelite concentrates recovered from copper ores by Control Mines Co. near Oracle will be shipped to the Metals Reserve stockpile at Phoenix. C. T. Palladine, of Oracle, is general manager and Morris Albertoli, superintendent.

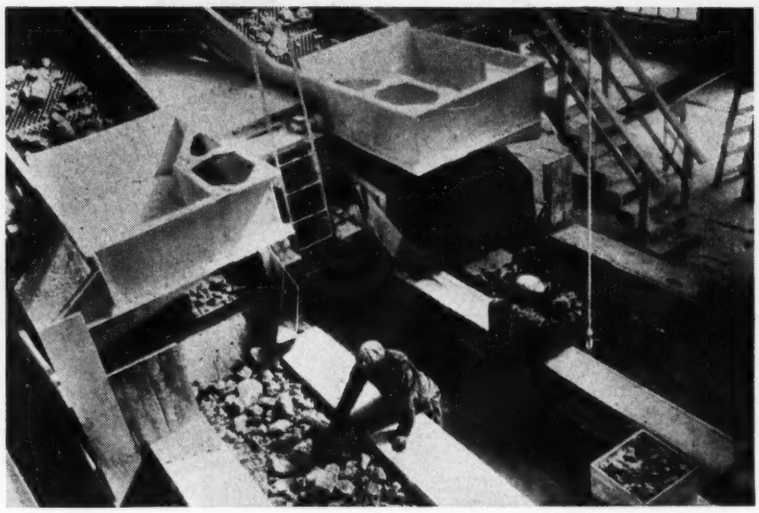
▶ Harold Russell and Ben Berne, of Payson, lessees of the Ox Bow mine owned by Paul Harrison, are shipping copper-gold ore to the International smelter at Miami.

▶ The U. S. Bureau of Mines is reported to have begun a diamond drilling campaign in the Chloride district, beginning with exploration of the Johnny Bull mine, just east of the Tennessee mine.

▶ Emerald Isle Copper Co., near Chloride. is resuming activity under the direction of Fred Goodale. A crew is to begin work on the property, and ore will be shipped from the dumps while mine development work is in progress.

▶ A carload of lead-zinc ore was shipped recently from the Manzanita property near Chloride. Russell Lord is manager at the mine.

▶ Daniell & Campbell, a partnership enterprise, is mining a fluorspar deposit near Wickenburg. William Daniell reports that the outcrop of the deposit is 4 ft. wide over a length of about 1,500 ft., and that the first carload of ore shipped ran 83 percent CaF_2. The partners also have opened a number of promising veins near the original discovery and have several more carloads of ore ready to ship.



Rock salt flows from the breaker house tower at the Retsof, N. Y., mine of International Salt Co., and passes over screens for primary grading and inspection. Fifty types of salt for varying chemical and civilian uses are produced

NEVADA

Combined Metals Reported Planning Expansion

Basic Refractories will build calcining plant—Bradley Mining Co. opens cinnabar pit at Goldbanks—U. S. B. M. to explore Darms coal property

▶ Reorganization of Combined Metals Reduction Co., with lead-zinc-silver mines and 550-ton selective flotation mill at Pioche, Lincoln County, is said to be in progress, following acquisition by a New York group of the 90 percent interest in Combined Metals owned by National Lead Co. Informed Pioche sources reported the new company will construct a plant, costing up to $2,000,000, to treat the large available volume of low-grade carbonate manganese ore that contains zinc, lead, silver and gold. Capacity of the flotation plant may be increased to a 1,000-ton minimum, it was stated. Properties and mill were examined recently by Herbert C. Hoover, in company with Lawrence K. Requa. Edward H. Snyder, manager for Combined Metals, will head the new company as president and manager. Other officers named are W. H. Gibson, vice president; C. M. Christensen, secretary; B. G. Sweet, treasurer; with Lawrence K. Requa and J. C. Jensen additional directors.

▶ A calcining plant, designed to dehydrate and reduce weight of the product, is to be built at once by Basic Refractories, Inc., of Cleveland at its brucite deposits at Gabbs Valley, northwestern Nye County, from which shipments at the rate of 3,600 tons monthly have been made to Maple Grove, Ohio. The pattern of the plant was said to have been worked out by American Cyanamid & Chemical Corp. at its Azusa, Calif., plant. Howard P. Eells, Jr., president of Basic Refractories, has been at the brucite property, where Charles E. Schwab, with office at Luning, is manager.

▶ In preparation for open-cut mining of cinnabar on a large scale, Bradley Mining Co., of San Francisco, is opening a large pit with power shovel and bulldozers at Goldbanks, a formerly productive district in east-central Pershing County. Some of the higher-grade ore is being trucked 130 miles to the company's furnace plant at its Opalite mines, across the State line in Oregon. Worthen Bradley is president.

▶ The Knowles brothers, of Elko, have rebuilt and are operating a 25-ton scheelite concentrator that was destroyed by fire in March at Harrison Pass, 50 miles south of Elko. They are working the old Star tungsten mine and had stockpiled a substantial tonnage of ore while rebuilding the mill.

▶ Old productive workings of the Cleveland lead-silver mine, in the Delno district, eastern Elko County, are being reopened by American Smelting & Refining Co. under direction of J. Fred Johnson, manager of mining operations, who makes his office headquarters at nearby Montello. The mine has been idle for many years, but formerly produced ore of high grade.

▶ Shipments of siliceous copper ore, containing some silver and a little gold, have been maintained for some weeks at the rate of a 70-ton carload per day from the Greenan-Kerr copper-tin mine at Majuba Hill, Pershing County, and will soon be increased to double this volume. James O. Greenan, Reno, is in direct charge. Some of the ore is high-grade cuprite and the shipping product is broken over a width of 30 ft. with crosscuts indicating more than double that width of ore. Final settlement had not yet been made by the Metals Reserve Co. for tin concentrate shipped after a recent mill-run on cassiterite from the Majuba Hill mine.

▶ A Bureau of Mines crew has assembled drilling equipment at the Darms coal property, at Coaldale, Esmeralda County, the Interior Department appropriation bill having included $40,000 for drilling the deposits. Stripping with bulldozers is said to have exposed a half mile of outcrops of the four proved beds, ranging from 6 to 40 ft. in thickness. Henry DeKay, Pittsburgh, Pa., coal geologist, is working on geology of the area and will direct drilling from the surface and from shafts that have opened good coal to a depth of 300 ft. H. A. Darms, Reno, has controlled the deposits for many years.

▶ The formerly productive Cahill cinnabar mine and small furnace plant in eastern Humboldt County have been acquired under lease and option and are being developed actively by Cordero Mining Co., foremost Nevada mercury producer, which also is working quicksilver claims lately acquired near Tuscarora, in Elko County. Labor shortage has curtailed production from the Cordero company's. 225-ton Herreshoff furnace at its property near McDermitt, northern Humboldt County. D. Ford McCormick is manager, and S. H. Williston of Portland, Ore., vice president.

▶ A shipment of 40 flasks of mercury

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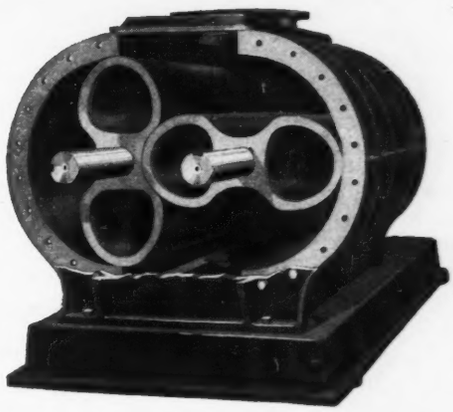
Because "R-C" Positive Displacement Blowers maintain their high efficiency when operating either under pressure or suction, they are naturally adapted to reversing ventilation systems for tunnels under construction. With the reversed ventilation system, only one pipe is needed to supply fresh air and to exhaust foul air and gases from the tunnel face. Records show that ventilation costs are cut, daily bore increased, and tunnel fog overcome by this system when operated with Roots-Connersville Blowers.

Also used extensively for supply air to smelters, flotation machines and pneumatic conveying systems, as well as for convertors and in acid making plants.



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More complete information on any of the above items may be had by writing for product literature. Descriptions are condensed from the bulletin "What's New in Safety," which will be mailed to you monthly on request.

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EVERYTHING BULLARD IN SAFETY

▶NEVADA

was made recently to the newly established Metals Reserve purchasing depot at Winnemucca from the furnace at the Red Bird mine of Harold's Club Mining Co., earlier shipments having been to San Francisco. Diamond drilling equipment, purchased by the company, is in use in exploring near the remarkable stope in the Red Bird mine. At the company's Valley View tungsten mine, in the Potosi district, scheelite is being trucked to the Metals Reserve stockpile, 5 miles south of the Getchell custom tungsten concentrator.

COLORADO

Leadville Leads Upsurge in Mining Activity

Treasury Tunnel continues—Midnight mine enters production—Pittsburg mine, at Central City, strikes new vein

▶The Treasury Tunnel, being driven to the Black Bear orebody, has again encountered a flow of ice-cold water, and progress has been hampered in that the miners must stop to thaw out from time to time. In 34 deg. water, progress cannot be expected to be at a maximum, but it is hoped that at least 50 ft. per day can be made in driving this bore.

▶Tanner tungsten mill on Beaver creek, a mile east of the Nederland-Rollinsville highway, has been destroyed by fire, with an estimated damage of $15,000.

▶Gilman property of New Jersey Zinc Co., under Mr. Jones, superintendent, reports a net profit for the quarter ending June 30, 1943, of nearly a million and three-quarters, as compared with over $2,150,000 for the same period in 1942. This property produces chiefly zinc and lead, although a large tonnage of copper-silver ore is also mined and shipped to Utah for smelting.

▶The Malachite copper prospect between Denver and Idaho Springs is being reopened under lease by the Ore Reduction Co. Productive some 40 years ago, when the ore was shipped to Swansea, Wales, for treatment, the copper-nickeltin mine will now be operated under the management of Otto V. Van Trotha, vice president of Ore Reduction Co. He plans to drive a new tunnel nearly 200 ft. below the old workings, hoping to strike the orebody in 650 to 700 ft. from the new adit. A new reduction plant will be built if the orebody warrants it. This company formerly operated in Summit County.

▶Country Boy mine, at Breckinridge, active during the first World War, is now operated by Garvie London Gold Mining Co. It is reported that a zinc-silver vein, sought by the company for months, has just been found. Samples taken from the new vein are said to assay from 25 to 50 percent zinc, with several ounces of silver showing. C. Lorimer Colburn, mining engineer, has enlarged the tunnel to 5x7 ft., installed both air and electric pumps, and added a large compressor to the operations. A 300-ft. winze will be sunk to get below the orebody, with a drift being driven from the winze at each 100-ft. level. The company has its own electric plant, with electric lights the entire length of the tunnel. A drainage ditch is provided below the track to carry water from the workings. Ore will be shipped to Colorado Springs.

▶Midnight mine, at Aspen, for many years operated under the supervision of Fred T. Willoughby, comprises 50 patented claims of zinc, silver, and lead, and a 60-ton flotation mill at Richmond Hill, about 6 miles south of town. Once again entering production, the company ships concentrates carrying about 500 oz. of silver and from 50 to 60 percent lead to the ton. This silver-lead concentrate is shipped to the A. S. & R. Co. smelter at Leadville, and zinc concentrates go to A. S. & R. Co. at Amarillo, Tex.

The 400-ft. winze put down to the ore from the tunnel level is being used as the working shaft, and the orebody has been opened for production by laterals from the shaft. Recently the 12-ft. orebody was also struck at a deeper level. The deeper tunnel on the property, driven by the old Highland Co., which had a lease on a part of the Midnight holdings, is about 1,200 ft. deep. Midnight Co. plans to drive this tunnel an additional 4,000 ft. or more to provide access to the orebody through the lower tunnel level. In addition a raise from the lower tunnel level will be driven to connect with the shaft from the upper tunnel. Mr. Willoughby is general manager, and L. E. Russell is president of the company now operating the Midnight.

▶W. K. Howard, having pumped out the lower workings of the Mendota mine, at Georgetown, has caught up the caves on the fourth level and reached stopes in which large bodies of zinc and lead ore were reported left exposed. He has been shipping ore from the fourteenth level to the Huntington mill, with some of the better ore going to the Golden Cycle mill, at Colorado Springs. Until the stopes in the Mendota are in condition for mining, mill ore will be drawn from the tunnel level of the Frostburg.

▶Old Billings tunnel, near Shavano, has struck zinc-lead ore, and C. L. Winnburn and Ralph DeGrazio have a quantity of it ready for shipment. Two miles of road have been constructed in North Fork Gulch of the Arkansas River, and two bridges built to improve access to the mine. W. K. Burns and H. R. Foster are also operating in this same section near Salida.

▶John Lambertson has trucked a carload of ore from the Star mine, near Gunnison, down through Taylor Park for loading at Almont. A second carload is being trucked, and he expects to ship about 200 tons of 35 to 40 percent lead ore this summer. Shipments cannot be made during the heavy snow season.

▶W. M. Halfhill, of Wellington, Kans., operating the Ocabams Co. on Tenderfoot Hill, Cripple Creek, has made a new gold strike. The 30 acres of hold-

ings consist of the Elridge, Haywood, Pinto, and Rodinbush claims. Halfhill states that some good ore has been found on the 200-ft. level, with assays showing 14.60 oz. of gold. Grab samples from the 52-ft. level are said to run over a half oz. of gold per ton. The company expects to ship at least five cars each week, when work gets under way. The main shaft is now down 200 ft., and the last 100 ft. had to be unwatered this summer before prospecting could be carried on. The company, composed largely of Kansas men, with Earl Wright, of Newton, Kan., as president, is shipping ore to the Golden Cycle mill.

▶Otto Ruttkamp is preparing to unwater the Running Lode mine, below Blackhawk. This property, which has not been worked for many years, is said to have had an abundance of fine ore when closed down.

▶United Beryllium Ore & Metals Corp. has been granted a $20,000 loan for development of a beryllium property between Big Thompson River and Buckhorn Creek in Larimer County near Drake. Eugene Bruell, of Cleveland, Ohio, president of United Beryllium, is believed to have purchased the property for the company.

▶To serve the workers of Wilfley Leasing Co. of Kokomo, now mining zinc ores, the Federal Housing Authority has authorized construction of 15 family housing units and the use of 12 family trailer housing units. This property, a heavy producer of zinc-silver-lead ore, was supplied with additional manpower recently by the War Department's release of soldiers for work in copper, zinc, and molybdenum mines.

▶Leadville residents and Colorado mining men have just joined in celebrating completion of the new 800-ton heavy-media mill of Ore & Chemical Co. of New York, and the reallotment of $1,400,000 by Congress for driving the Leadville drainage tunnel (*E.&M.J.*, Sept., 1943). The Ore & Chemical Co. mill was erected by Knapp Engineering Co. and will handle Leadville dump ores. Though the heavy-media separation process is new to Colorado, it has been successfully used in the Tri-state district. Kurt Spohr will be in charge of operations for the company.

▶G. W. Danehy, managing director of Kingmill Mines, Inc., operating the Pittsburg Notaway properties near Central City, reports that large reserves of medium-grade copper ores on the Notaway vein were developed during 1942. He further states that an important strike of copper-gold-silver-iron ore has been made on the once-famous Pittsburg property.

During 60 years of operation of the Pittsburg, all the ore was taken from one main shoot which started near the collar of the 1,100-ft. shaft and pitched to the east. This body of ore constantly bore to the east with depth; likewise, each succeeding level found the orebody longer, and on the 900,- 1,000,- and 1,100-ft. levels the main orebody extended for over 650 ft. It was thought that this orebody should have more than one east-bearing shoot, although a large amount of exploration work had

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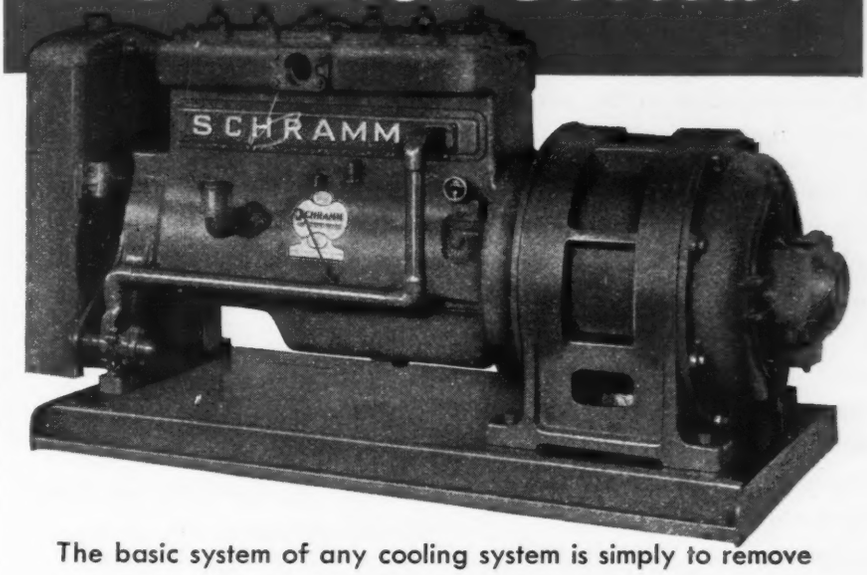

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Type "A" is adapted for drainage collection, and in the milling stages for handling acids, slimes and slurries.

Type "T" is used for both mining and milling operations under flooded intake conditions or where priming is no obstacle.

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The wet pit pumps—"SW" and "QW"—have inverted intakes and no stuffing boxes, eliminating the nuisance of air-binding and the need for packing. For dry pit work, the "SD" pump offers light weight, rigidity and simplicity.

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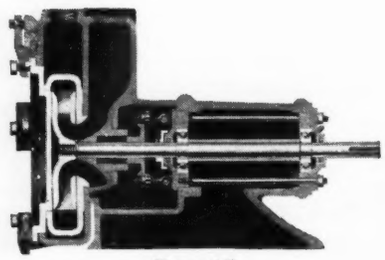

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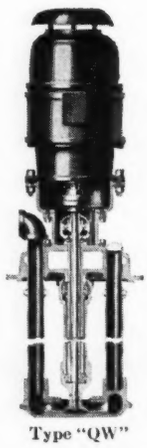

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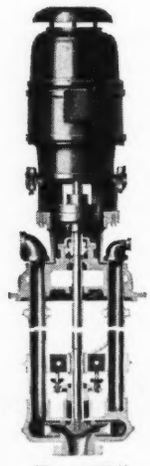

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▶COLORADO

failed to locate another; and in Danehy's report in 1940 he stated that it was his opinion that "the Pittsburg ore had been faulted into the footwall west of the shaft, or that the mineralization on the Pittsburg vein proper, the valuable portion of a double mineralization, had been due to the junction with another vein, the mineralizer of the Pittsburg."

The footwall country was explored west of the shaft with a crosscut in the west drift of the 400-ft. level, where Danehy states they found the vein which joined the Pittsburg vein near the shaft. The main Pittsburg vein is typical of the first period of pyritic mineralization in this district, but the new vein belongs to a later mineralization period. This latter apparently laid down copper sulphides containing values in gold and silver. The Pittsburg oreshoot was formed where these two veins joined; and it now appears that where the veins split going west, the valuable ore went into the footwall.

▶ Ore from the Idaho Bride mine, in Gilpin County, has kept the Ruth mill operating, and Gilbert McGrath, manager, says this ore is rich in copper.

▶ New impetus has been given the tungsten industry in Boulder County because of stockpiling arrangements at Nederland set up by the R.F.C. Freight rates on thirty-dollar ore to Salt Lake City amount to nearly $5.50 a ton, and this local stockpiling provides a substantial increase in values to the producer. E. B. Hill, Jr., of Boulder, who is in charge of the depot, will buy as little as a ton of ore if it runs over 5 percent WO_3, and lower grade ores will be purchased in lots of ten tons or more. This is the second stockpiling arrangement in Colorado and the 22d in the West.

▶ The recent extension of the REA electric lines in Chaffee County has given impetus to the mining and milling of fluorspar ores in this section. Orebodies about 11 miles west of Salida are worked by Kramer Mines, Colorado & American Flourspar Co., and Chaffee County Fluorspar Co. Considerable development work has been done recently by the last-named company under the direction of Peter L. Bancroft.

▶ W. W. Wiechmann, deputy chief of the resources section of the mining division of WPB, has granted a third extension to the Golden Cycle Corp. for the continuance of its gold mining. This includes shippers and lessees and the Stratton Cripple Creek Mining & Development Co. Merrill E. Shoup, president of Golden Cycle, states that the company treats approximately 300 tons of zinc-lead ore daily.

▶ George K. Marshall, in Idaho Springs, has cut in the power on the famous Old Town mining property in Russell Gulch, and men are working on the seventh level. Stope fills are being hoisted for test runs, and the property, which is said to show a pay-streak on the Old Town vein of 4 ft. of copper-gold-silver ore, may soon be in production.

The workings comprise over 5 miles of development work, a tunnel 4,300 ft. long, and an inclined shaft over 2,200 ft. long. It is not the intention of the new operators to mine virgin ore but to see if a profit can be made on milling the stope fills.

▶ Independence silver-lead-zinc mine, near Silverton, has been taken over by Ross Fitch and associates under leases, and an exploration and development program has already been formulated.

▶ Charles A. Chase, general manager of Shenandoah-Dives Mining Co. at Silverton, reports that net income from the years 1941 and 1942 was $125,199 and $19,462, respectively. Three things have been of major importance to the operations, namely: granting of premium prices by the Metals Reserve Co.; supplemental contract with A. S. & R. Co. by which the Silver Lake unit will be operated for 15 years; and reaching ore on the 1,700-ft. level of the Terrible claim in July.

UTAH

New Park Mining Co. Buys Spotted Fawn Claims

Ohio Copper to start leaching plant—Union waives seniority rights for women workers—Utah mines need 1,200 more men

▶ Notwithstanding the release of soldiers for work in the metal mines of the State, operators are still confronted with a labor shortage. On Sept. 6 an effort was launched to recruit an additional 1,200 men needed in mines, mills, and smelters. Representatives of the selective service, the War Manpower Commission, civic leaders, and the U. S. Army met with A. S. Brown, chairman of the state department of publicity and industrial relations. Steps taken by the Army in freeing soldiers for work in the mines are said to have yielded disappointing results. Many of the men, it was found, could not pass the required physical examinations. Draft-eligible fathers are being urged to register with the U.S. employment service and transfer from non-essential to essential war activities, under which work in mines and smelters is classified.

▶ Directors of Tintic Standard Mining Co. have declared a dividend of 5c. a share, payable Sept. 30. This dividend, of 57,402.50, increases the company's grand total of disbursements to stockholders to $18,722,063.82.

▶ An important transfer of property was effected by W. H. H. Cranmer, president and general manager of New Park Mining Co., at Keetley, in the east Park City district. The company, announced Mr. Cranmer, has purchased the Spotted Fawn group of 60 acres from the Keith estate and Kearns Corp. This territory lies just south of the Mirriam group, where the New Park company is now carrying on exploration work from its Star of Utah tunnel. Present production

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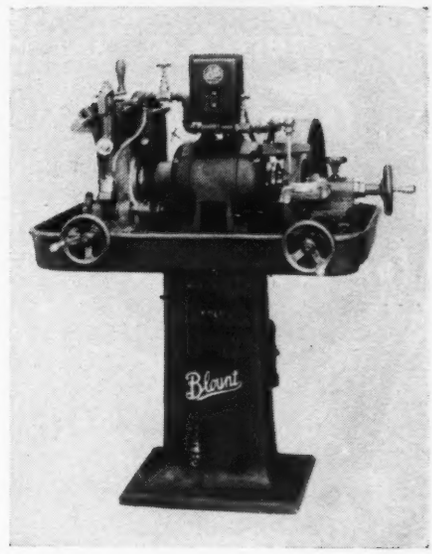

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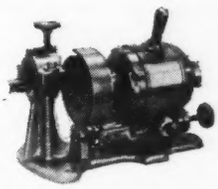

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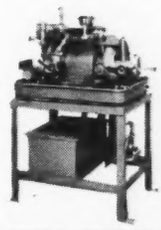

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▶UTAH

of the New Park is coming from the Park Galena-Mayflower fissure, and conditions indicate that another shoot will be opened in the Mirriam group. The Mayflower tunnel is being extended westward along this important mineral channel, and several highly mineralized fissures have been exposed. In addition to the Spotted Fawn group, the New Park Co. has acquired the mineral rights to 800 acres of ground lying to the south belonging to Parley Probst. J. A. Cooper, Mr. Cranmer announced, has been employed for the newly created position of manager of mines and will have charge of production in the Showers and Bowers mines being developed in the Tintic district and in the east Park City properties of the company.

▶ The Utah section of the American Institute of Mining and Metallurgy will give a dinner at the Hotel Utah on Oct. 25 in honor of C. H. Mathewson, national president, and A. B. Parsons, secretary. Mr. Mathewson will speak on "The Future of Metals and Alloys."

▶ The schedule of Ohio Copper Co. calls for starting operations at its 250-ton leaching plant at the Big Indian Copper property, 45 miles southeast of Moab, early in October. Open-cut operations have been carried on for several months by the company, which operates a combination mill on Ohio Copper tailings at Lark, in the Bingham district.

▶ J. Frank Marble, local president of the International Union of Mine, Mill, and Smelter Workers, announces that Utah locals of the union have waived seniority rights temporarily to women, so that they may fill less strenuous jobs in mills and smelters and thus aid in relieving the manpower shortage.

IDAHO

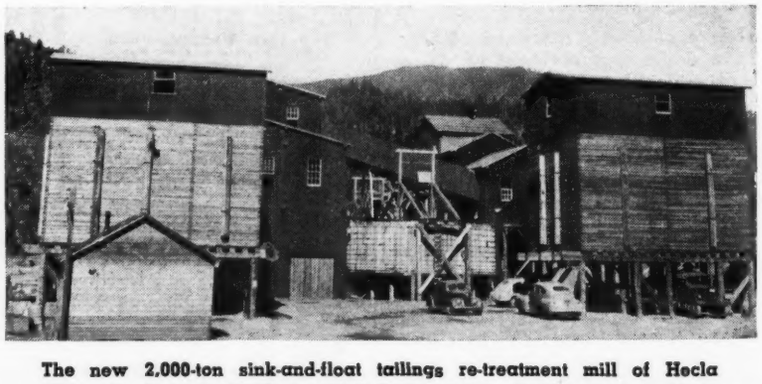
New Zinc Producers Developing Near Wallace

Mica and beryl deposits developed in Latah County—Senator Stewart mine to be reopened—Vanadium orebody discovered in Bear Lake County

▶ Mica-beryl deposits of Latah County are under development by both government and private interests, according to S. H. Lorain, district engineer at Moscow for the U. S. Bureau of Mines. Mica Mountain near Avon, where large mica-beryllium dikes are exposed, will be the scene of operations by the Bureau. It is planned to continue this work until winter weather causes a halt. Bulldozers are employed in stripping the outcrops at the likeliest places. Mica Mountain is said by engineers to be the center of a large area of mica schists on which little work has been done in the past. Frank Eichelberger of Spokane, Wash., former general manager of the Sunshine mine, in the Coeur d' Alenes, has become interested in the Latah County mica deposits and has purchased the interests of Tonopah Mining Co. in that district. These holdings are said to cover about 400 acres, and work is under way on one group, known as the Doerr property.

▶ C. A. Dye, formerly of Salmon, is now operating Dome Mining Co. in Butte County near Howe. The company recently acquired the Great Western and Wilbert mining groups, and is expanding the 25-ton Wilbert mill to a 100-ton flotation plant.

▶ The Beaver Creek district, in Shoshone County, is rapidly becoming the center of a major zinc producing area with an extensive development program well under way. The mines are at the head of Beaver Creek a few miles north of Wallace, and were partly developed following the gold rush period of the early '90's. Bodies of zinc ore were disclosed, but low prices in the early days and poor milling facilities made the operations unprofitable. Monitor Mining Co., organized a few months ago by the Day Mining interests of Wallace, owners of the Tamarack, Dayrock, Sherman, Hercules, and many other Coeur d'Alene properties, has by purchase and trade acquired ownership of 12 defunct mining concerns which had operated in the Beaver Creek sections but had long been idle. Large sums have been spent by the Monitor management in development operations and in the installation of modern equipment. The old Ray-Jefferson mill, built more than 20 years ago, is being remodeled to treat the zinc-lead ores of



The new 2,000-ton sink-and-float tailings re-treatment mill of Hecla Mining Co. between Wallace and Kellogg, Idaho. A primary concentrate made here will be sent to the Hecla and Polaris mills for finishing

several of the newly opened mines. Ore from some of the Monitor holdings is now being trucked to the Dayrock mill, near Wallace. The U. S. Bureau of Mines, whose diamond drill crews have been prospecting the area for many months, is reported to have made important new discoveries in addition to the present known veins.

▶ Leasers operating the Sunset mine, at the head of Beaver Creek, are reported to be shipping approximately 100 tons of zinc-lead ore per day to the Golconda mill. The Sunset mine was developed by Senator W. A. Clark, one-time copper king of Montana. Under Clark's direction, engineers drove long tunnels and sank a deep shaft, exposing large tonnages of ore and placing the mine in condition for a long period of production. But other interests engaged the copper magnate, and he allowed the property to stand idle. After his death, leasing groups started a production which can continue as long as zinc ore prices are at present levels.

▶ The Hypotheek mine, near Kingston in the west end of the Coeur d' Alenes, may soon be operated again, according to Roy H. Kingsbury, secretary. The mine was a producer of lead-zinc-silver ore 20 years ago, when it supplied a 200-ton mill. Low metal prices caused the closure of the property. It is developed by a shaft down to the 1,100-ft. level, two tunnels 700 and 1,500 ft. long with underground operating workings covering 37,000 ft.

▶ The famous Senator Stewart mine, from which F. Augustus Heinze, of Butte copper fame, took several millions in dividends, is to be reopened again after lying idle for nearly 25 years. Silver Bowl, Inc., of Kellogg, of which L. S. Harrison, prominent mining attorney, is president-manager, has acquired title to the entire Senator Stewart holdings and has had geologists and engineers making a detailed study of ore resources. According to the management, the Heinze shaft, sunk to the 600-ft. level, will be carried down an additional 1,000 ft. for exploratory purposes. Considerable ore is said to be available from the upper levels of the mine, and a newly discovered zinc-lead bearing vein, north of the Osburn fault, will be explored from the Fir tunnel level. The Stewart mine lies adjacent to the Bunker Hill & Sullivan and Caledonia mines, a mile west of Kellogg.

▶ The Nevada Stewart mine, in the Pine Creek district of the Coeur d' Alenes, has been purchased by a group of Spokane mining men headed by Frank Luedke, and an active development program has started. New equipment has been installed and the work of opening the vein is well under way. The ore, of zinc and lead, is similar to that of the mine's near neighbors, the Sidney and Highland-Surprise, both heavy producers.

▶ A body of high-grade vanadium ore is reported to have been discovered recently by Howard Broomhead, of Bloomington, and Laud Rigne, of Paris, in Bear Lake County of southern Idaho. The vanadium was said to have been found in the old workings of a coal deposit, the coal miners not recognizing the

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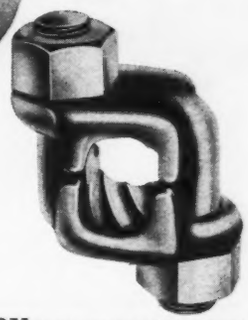

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▶IDAHO

character of the ore. The mine had been abandoned for years after the coal proved unprofitable.

▶ Stockholders of Sunshine Consolidated, Inc., owning a large group of claims adjoining the Sunshine mine, in the silver belt of the Coeur d' Alenes, have been called to meet on Oct. 20 at Kellogg to vote on a proposed operating agreement with the Sunshine company. The directors of both corporations have agreed on the terms of the agreement, which calls for operating the mine from the 3,100-ft. level of the Sunshine, where a commercial body of silver-copper-antimony ore has been developed. The operating proposal is practically a 50-50 deal, the Sunshine company having all required facilities for mining, milling, and selling the ore, which is similar to that treated from its own mine. W. A. Yeaman, Yakima, Wash., is president-manager of Sunshine Consolidated.

WASHINGTON

Tacoma Smelter Offers Premium for Silica

Metaline district running short of power—Chelan County surveys its resources—To explore Van Stone property at Northport

▶ Some of the most important mineral deposits in Washington are in Chelan County, according to a special report by Harold E. Culver, supervisor of the State Division of Geology. Marshall T. Huntting is author of the report. He has regrouped the mineral districts in that county into nine, and he classifies as mines, those properties which have actually produced ore, and the others as prospects. The biggest mine in the State is that of Howe Sound Co., in Chelan County, and another large holding is that of Royal Development Co. Besides gold, this district has such strategic minerals as cobalt, nickel, chrome, mercury, and iron, with traces of tin and platinum. In the Blewett district, about ten miles west of Wenatchee, are 13 listed properties. Some of the nickel, the report says, runs as high as 2.5 percent. Most of the mining has been on Nigger and Peshastin creeks.

▶ Old-time prospectors were immediately interested in the Associated Press report of Secretary Ickes' statement that five prospecting parties will be put into the field in this State in search of strategic minerals. These parties will be composed of U. S. Bureau of Mines engineers, but the Bureau's office in Spokane states that it has no further information on this proposed work.

▶ F. H. Gunnell, of the U. S. Bureau of Mines, has said that a new office of the Bureau is being established on the campus of the Washington State College, at Pullman, and that two resident engineers will be stationed there for consultation on problems of exploration and production of minerals.

▶ Diamond drills will be used to explor the Van Stone property, near Northport where lead-zinc-silver values are reported. The property was recently acquired by Willow Creek Co. from J. Richard Brown, mining engineer.

▶ Moonlight Mining Co. has acquired the Morning mine and obtained an option on the adjoining Burrus property near Aladdin, in Stevens County. The company is installing a concentrator. A. E. Wilkerson, of Colville, is president; and E. L. Sheldon, of Newport, is secretary.

▶ E. A. White, manager of the Tacoma smelter of American Smelting & Refining Co., is willing to pay a premium on ore containing silica needed in the smelting operations. Silica for this plant formerly was contained in the gold ores which it treated.

▶ Stenstrom brothers have leased an iron property a few miles west of Pateros, Okanogan County, and have moved equipment to it from a property they were working at Twisp.

▶ The Congressional committee on Upper Columbia Resources, in hearings in this State, was informed that the further development of power at Grand Coulee dam would be of immediate advantage to owners of mining property in that region. Congressman Compton I. White of Idaho is chairman of this committee. Harold E. Culver, state supervisor of geology, says there may be 5,000,000 tons of iron ore in the Blewett district, in central Washington, but that higher estimates are probably too optimistic. Washington Nickel Mining & Alloys Co. holds some of this iron acreage, and has leased it to American Minerals Resources Co., of Detroit.

▶ W. J. Miller and two associates extracted tungsten ore with a reported value of $15,000 from the "worked-out" Germania tungsten mine, in southwestern Stevens County. After stopping work, Mr. Miller returned and reports he has broken open a ledge of scheelite nearly 4 ft. wide. He hopes to secure a crew to work the property. This mine was last extensively worked by General Electric Co.

▶ Having solved fairly well the problem of manpower shortage by the receipt of about 60 soldier-miners released by the army, the Metaline district, in the northeastern part of the State, finds that its next major need is additional power. The users are American Zinc, Lead & Smelting Co., Metaline Mining & Leasing Co., Pend Oreille Mines & Metals Co., the town of Metaline Falls, and the Lehigh Portland Cement Co. D. I. Hayes, western manager of American Zinc, says this additional power must be provided if the district is to come up to its possibilities in zinc production. There are several ways in which the power can be supplied. Washington Water Power Co., of Spokane, could extend a line into the district, Pend Oreille Mines & Metals Co. could put in a new unit at its plant in the Pend Oreille river, and additional diesel power could be provided. In the meantime Halverson Construction Co, of Salem, Ore., is going ahead rapidly with its contract, amounting to $300,000, for providing dormitory, dwelling, and cafeteria accommodations to care for the increased number of employees in this district.

▶ Men of Chewelah and Spokane, who have acquired the plant of Western Molybdenum Co., are perfecting a new organization to use this plant in further production of molybdenum, tungsten, and copper found in the old Juno-Echo mine, at Chewelah. Western Molybdenum Co. did considerable work in developing the property and building the mill. The plant was sold by the receiver for $1,075 to the new owners, represented by J. J. Scherr, of Spokane, one of them.

ARKANSAS

MRC Iron Penalty Injures State's Bauxite Output

Confederate Home development postponed —Zinc and lead field reviving—Par-Mar Engineering takes over Kelley mine, in Pfeiffer district

▶ Newly opened and prospective bauxite mining enterprises in Pulaski County were threatened with extinction recently by the penalty recently placed by Metals Reserve Co. on excess ferrous iron content of bauxite shipped to Arkansas' aluminum plants. The new order places a penalty of 43c. per ton on each percent of ferrous iron above 6 percent.

Homer M. Adkins, Governor of Arkansas, said that everything possible would be done to assist those whose mines would be rendered unworkable by the new penalty. Among the proposed operations the position of which appears insecure as a result of the order, is that contemplated for the bauxite deposits under the site of the Confederate Home in Pulaski County. It was reported that Governor Adkins will recommend postponement of further development work there until he is assured the State will not risk losing money in the enterprise.

▶ Production of high-grade manganese ore in the Batesville-Cushman field ran to 745 tons during August. New operations started during the last 60 days and new plants now under construction should greatly increase production during the next few months. Though no beneficiating plants for low-grade ore have been installed, successful tests have been made, and it is probable that within the next six months plants for this purpose will be installed and low-grade material will find a market again.

▶ The most unusual body of ore ever found in the field is on the Austin property, near Mt. Pleasant, now being operated by Stanley Bourne and Ernest Stroud, of Batesville. When the mine was visited in August, No. 1 shaft had cut through 12 ft. of pyrolusite. In September, the shaft was down to a depth of 72 ft., and had cut 36 ft. of this ore without yet sinking through it. The Austin company has about 10 tons of ore in its bin and is preparing to start shipments soon.

▶ Walter H. Denison Manganese Co., of Cushman, Ark., was the largest producer in the field in August. Its total production ran 396 tons of high grade.

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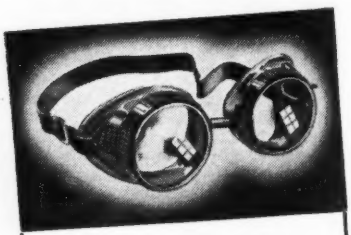

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▶ARKANSAS

The company is operating several properties in the Pfeiffer District, and all August production came from that area. Mr. Denison is also mining high-grade ore from a property near Flagstaff, Ariz.

▶ Arkansas Manganese Co., headed by Jack Gibbons, of Cushman, operating the Aydelotte mine, near Cushman, was the second largest producer in the field in August with 104 tons of high grade. Several new shafts are in operation.

▶ Major F. D. Ruggles has charge of the Metals Reserve buying depot at Batesville, succeeding I. C. Watkins, who was moved to Washington, D. C. Major Ruggles has had considerable experience in manganese mining in Tennessee and is familiar with all grades of the ore he is now handling. The phosphorus specifications have been raised from 0.18 to 0.35, which will give local producers a better market. Metals Reserve is now buying practically all of the ore produced in the field.

▶ Preston Grace and Marshall McGee of Batesville, who took over Consolidated Mining Co.'s properties on Cave Creek, made a production of 50 tons of high grade during August. Their ore is now coming from a 300-ft. tunnel, which they recently drove on the Chin property.

▶ Charles Sims, of Cushman, who is operating the Turner property, made his regular 50 ton production of high grade in August.

▶ E. & A. Mining Co., James Wood, operating engineer, of Batesville, is conducting hydraulic operations on a property on the Bayou, four miles northeast of Batesville. A washing and concentrating plant now under construction, will be completed in a few weeks.

▶ Par-Mar Engineering Co., James Wood, operating engineer, and Max Cohen, works manager, both of Batesville, has taken over the Kelley mine, in the Pfeiffer district. The company has a small pilot plant under construction on the Bayou at Batesville to work out a concentrating process to treat the low-grade ore, several hundred tons of which are at the new plant awaiting treatment. The Par-Mar is also conducting hydraulic operations on its property on Lafferty Creek. Production in August was 70 tons of high grade.

▶ Southern Mining & Manganese Co., headed by Herman Miller and B. W. Fitzgerald, of Batesville, operating the Southern Hill property, near Cushman, produced 35 tons of high grade in August.

▶ Hendricks Mining & Milling Co., headed by A. C. Hendricks, of Batesville, is installing a big washing and concentrating plant on its Polk-South property. A pipe line from the Bayou to the plant, a distance of three miles, will furnish water for the mill, which will have a capacity of 100 tons an hour. V. C. Johnson, of Little Rock, one of the associates, started operations with a heavy power shovel and accumulated a stockpile of 40,000 tons of wash ore which will be treated first.

▶ Though no gains have been made in production in the North Arkansas zinc and lead field during the last 30 days, several new operations are gaining headway, and three new mills are planned.

▶ Newton County Mining Co., headed by Charles Herman, of Jasper, has completed a new 100-ton concentrating plant at Jasper, and will begin milling operations soon. The company, which owns the Canton, Blue Bluff, Keys Gap, Lamar, and Panther Creek properties, is working on the Canton. In one heading on this property there is a face about 100 ft. wide and 6 ft. high, of high-grade resin jack. Besides milling its own ores, the company will also do custom milling. Art Goatley, pioneer millman, and W. C. McCurry, pioneer miner, have recently been employed by the company to handle operations.

▶ Hall Mountain Mining Co., J. C. Jones, of Yellville, in charge of operations, is encountering some good ore on its 1,220-acre tract near Yellville. The tunnel on the Truex is back about 150 ft. Good high-grade zinc carbonate has been encountered in clay in this tunnel. One day recently, a crew mined out one 2,500-lb. ore boulder. The tunnel on the Wickersham is back about 100 ft., and the ore face here is about 5 ft. high. The tunnel on the Willett has been driven into the mountain about 250 ft. with a good run of mixed jack and carbonate in the heading. Mill equipment has been purchased and the mill will be erected as soon as sufficient ore has been proved up to keep it in steady operation.

▶ Silver Hollow Mining Co., operating the Silver Hollow and Silver Queen mines, in the Rush Creek district and headed by W. J. Cushing and John Dirst, of Yellville, is in steady operation. Production is now running approximately a car of high-grade jack concentrates a month. Shortage of labor and supplies has greatly retarded production.

▶ Moark Mining Co., of Zinc, Ark., headed by C. T. Rabenau, is steadily producing a high-grade silicate of zinc concentrate. A good run of high-grade jack was encountered in its exploration tunnel being driven on the Jack Pot property. The company holds leases on the Jack Pot, Minnie Lee, Red Mill, and Almy properties in the Zinc district.

▶ Excelsior Mining Co., headed by Doyle Palmer, of Harrison, and operating the Excelsior mine, near St. Joe, has been idle about six weeks. Shut down for the purpose of exploration work on the property, the group has not been able to get its drilling operations started.

▶ A. R. Seabass & Co., which holds leases on the Baker, Brewer, and Kilgore properties in the Ponca district, in Newton County, will start operations within the next two weeks. One 300-ft. incline tunnel has been completed on the Brewer, and good ore was encountered. Other good ore faces are said to have been opened up, and a new mill may be built on the property soon.

▶ Le Roy Mining Co., headed by Roy Wernicke, of Harrison, operating the Jumbo mine, on Buffalo River, in Newton county, is conducting drilling operations. Two holes have been completed,

and a run of jack was found in each one.

▶ A fair showing of lead has been encountered on the Primrose property in the Ponca district in Newton County. The property is under lease to Cleve Byrd, of Harrison, and Charles Bagnell, of Denver, Colo. They have their tunnel back in the mountain about 35 ft., and hope to drive into a good body of lead carbonate.

▶ Operations will be started at the Hurricane mine, in Searcy County, within the next few weeks. It is operated by Hurricane Mining Co., in charge of J. C. Shepherd, of Harrison, who expects to excavate down to the ore level the old mine pit that was filled up with debris by a water spout several years ago. The company also expects to install a new mill.

▶ Joe W. Kimzey, State Geologist, of Arkansas, has disclosed that he is encouraging extensive experiments with Arkansas lignite to determine its value as a fuel and also as a source of plastic and dye. Arkansas has millions of tons of lignite which in the past has been treated as waste.

▶ M. B. McLeod, Revenue Commissioner, reported on Sept. 4 that bauxite severance tax collections have jumped from $35,404.66 in July, 1941, to $50,404.85 in August, 1943. This increase is credited to the completion of the Hurricane Creek and Lake Catherine aluminum plants, which handle an increasing amount of bauxite. Between these two dates the State has collected $482,351.15 in bauxite severance tax.

▶ J. R. Thoenen, district engineer, U. S. Bureau of Mines, explained the objectionable odor emanating from the waste from the bauxite strippings in southern Pulaski County, Ark., as incomplete combustion of lignite lying close to bauxite ores in the earth. Mr. Thoenen said: "Iron pyrite when exposed to the air oxidizes and sets the coal afire. Incomplete combustion of the gases from this oxidation causes the disagreeable odor." The only remedy for this is to move stripping operations elsewhere.

TRI-STATE

Wage Increase Granted Nearly All Local Miners

Manpower situation remains acute—Eagle-Picher equips new shaft near Baxter Springs—Cooley Brothers start new mill

▶ Within a week after its appointment, a special non-ferrous metals panel of the War Labor Board on Aug. 30 granted 62 Tri-State mining companies permission to increase the wages of approximately 4,500 miners 50c. a day. Sixty applications, affecting 4,963 employees were filed with the panel, and all but eight were approved. The companies whose applications were denied are: Rialto Mining Corp., C. K. & E. Mining Co., Beck Mining Co., M. & M. Mining Co., Stotts

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Cooley Brothers Gravel Co., former Colorado gold miners, now mine lead and zinc in this open pit near Webb City, Mo. A LeTourneau Bulldozer on a Caterpillar tractor cleans out ore pockets, and a Monighan dragline loads the material.

▶TRI-STATE

City Mining Co., Hi-Y Mining Co., and Mineral Products, Inc.

"Due to the fact that the proposed wage scales in similar job classifications were higher in these cases than those passed upon recently by Director of Economic Stabilization Vinson following a wage dispute hearing affecting the employees of five unionized companies in the district, the panel tabled these eight applications for further investigation and study," said William T. Irons, wage stabilization analyst for the Kansas City regional WLB, who is chairman and public member pro tem of the panel. He added:

"They will be referred to the regional board for an interpretation of the panel's authority on this particular point, and those companies involved have been advised by mail to that effect." At the latest report (Sept. 18), the eight cases still were pending before the board.

Many of the mining concerns requested that the increases be made retroactive to Aug. 15, the date of Vinson's order, but the panel was unable to agree on that issue and referred it also to the regional board for interpretation. With no retroactive date on the application, the panel made its rulings effective as of the date of approval, or date of application. In keeping with the equivalent of the 50c.-a-day increase, shovelers generally were granted an increase of 1c. a can, with the alternative of 50c. a day more on their "spot" bonuses per diem.

Besides Irons, the non-ferrous panel was composed of Paul Childress, Joplin mine operator, and Gobel F. Cravens, of Joplin, executive board member of district No. 4, International Union of Mine, Mill and Smelter Workers (CIO). In the absence of Childress, Ray McNaughton, Miami attorney, and O. W. Bilharz, Baxter Springs mine operator, served as alternates representing industry during the entire sitting of the panel in the district.

▶Of the total of 4,550 service men that WPB announced had been released by the army to work in copper, zinc, and molybdenum mines, approximately 100 have gone to work in Tri-State properties, it was reported unofficially. One-half of these men are with Eagle-Picher Mining & Smelting Co., and the remainder are said to be divided equally between St. Louis Smelting & Refining Co. and Federal Mining & Smelting Co. With local mining industry in need of at least 1,500 more miners, the manpower situation remains acute.

▶Three mine fires of no small consequence occurred in the district during the last month. Three miners were trapped underground more than five hours Sunday night, Aug. 23, when fire destroyed a large derrick and boiler room at the Engineering Mining Co.'s mine at Thomas Station, four miles northwest of Joplin. Firemen from Joplin and Carl Junction, and volunteer mine workers, headed by Bill Burdett, of Joplin, formerly superintendent at the mine, aided the three miners by forcing air down to them through a drill hole while the burning cribbing in the 180-ft. mine shaft was being extinguished.

The fire broke out when a tank of gasoline exploded and spread flames rapidly through the big timbers supporting the derrick over the shaft. The destroyed property was owned by Clifford Carr, of Kansas City. Loss was estimated at $5,000.

Two other fires were caused by lightning which struck important mine pumping stations early in September. One was at the Paxson property of Eagle-Picher Mining & Smelting Co., west of Baxter Springs, and the other was the Muskogee pump station, near Quapaw. The latter is operated by several mining companies in the southeastern Picher field as a cooperative dewatering project. Both pump stations, including a blacksmith shop at the Paxson property, were destroyed and large turbine pumps which they housed were damaged. Loss at the Paxson was estimated between $12,000 and $15,000, and that at the Muskogee amounted to several thousand dollars. The stations were rebuilt immediately, equipment was either replaced or repaired, and mine operations were not interrupted.

▶As agent for the Metals Reserve Co., Eagle-Picher has moved the west derrick and hopper from the old H. H. & H. lease, northwest of Baxter Springs, to a new shaft put down on the Stoskopf lease as a part of the company's (MRC) Paxson operations west of Baxter Springs.

The hoisting derrick and 300-ton hopper were originally built and operated last year on the Morrison land by the Oldham Mining Co.

The new Stoskopf shaft was put down to the 326-ft. level, on which mine operations will proceed in low-grade ore. A new road has been built to the mine, from which ore will be trucked to the Eagle-Picher Paxson mill for treatment. The Paxson operations of Eagle-Picher were begun on behalf of Metals Reserve to increase the district's zinc output.

▸Cooley Brothers have started operations at their new milling plant completed recently on the Corl land a short distance southwest of their open-pit zinc-lead mine at Sucker Flat, near Webb City, according to C. G. Cooley, partner in the firm. The plant is producing zinc-lead concentrates from 15,000 tons of stockpiled ore taken from the 80- to 90-ft. levels of the mine. L. M. Cooley is the other partner in the concern, in which Carl K. Carmean is associated as mining engineer in charge. Development of the open-pit mine is progressing.

▸Mahutska Mining Co. has completed a new 350-ton hopper, with boulder conveyor, at a shaft on the 80-acre Jeff City lease, east of Picher, according to Harold Childress. The company is mining on the 190 and 245-ft. levels on the lease and will pull dirt at the shaft from the 160-ft. on the adjoining Blackeagle lease to the northeast.

Mining operations will be continued by the company on the Black Hawk, Acme, and Mahutska leases, in the same general area, ore from which is hoisted at the company's derrick on the Mahutska. Ore from all operations is shipped by rail to the Eagle-Picher Central mill for treatment.

Childress also reported the completion of a derrick-hopper by Childress-Heggem Mining Co. on the north forty of the old Childress-Heggem lease, near Cardin, where the 190 and 300-ft. levels are being mined. Ore is trucked to the Royal custom mill of United Zinc Smelting Corp., southeast of Picher, for treatment.

▸Bluebird Mining Co. has completed a new derrick and 400-ton hopper on the old Bilharz Bluebird mine lease, near Cardin. The company has been working on the 300-ft. level on the lease for some time. A railroad spur has been extended from the NEO tracks near by to the new wooden storage unit, and ore is being shipped to the Eagle-Picher Central mill for treatment. Associated in the company are Guy Blackmer, Ralph Sears, R. B. Walker, Robert Tuthill, and Charles Osborn, all of Miami; Carl Williams, of Commerce, and T. F. Lennan, of Joplin.

▸Kaw Valley Mining Co. has opened a shallow deposit of zinc-lead ore on the Kansas-Missouri Lands & Mining Co. acreage in the east part of the old Cave Springs mining area between Joplin and Galena. The deposit, 45 to 60 ft. in depth, was drilled out by the Eagle-Picher company a year or two ago near the old Happy Rock mine, and was subsequently leased to Paul Poole, of Poole Construction Co. at Galena, who is in charge of present development work. A new shaft has been put down south of the old Happy Rock mine, and approxi-

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▶TRI-STATE

mately 300 tons of pay dirt has been hoisted. Water encountered in the shaft was handled by a 6-in. turbine pump powered by a gasoline motor.

▶ Another strike of zinc ore by American Zinc, Lead & Smelting Co. has been reported southeast of the Aurora city limits. The latest strike is on the Homer LeDuc land, and shows a 50-ft. face of ore according to drill records.

▶ A zinc-lead ore strike on the Wakefield and Hogson land, northwest of Carthage, has been reported by Charles Allsbury, of Webb City, who, with Frank Danglade, of Webb City, and Jim Hickman, of Oronogo, is carrying on a drilling program in that area. The ore was encountered in a hard-ground, flint formation from the 210 to the 242-ft. level, Allsbury said.

MICHIGAN

Calumet & Hecla Will Remodel Calumet Mill

Centennial mines to be reopened—Conglomerate tailings deposits to be worked out soon

▶ In order to mill the copper rock expected from Allouez No. 3 shaft and such amygdaloid as will be beyond the capacity of the Ahmeek mill, the Calumet mill at Lake Linden is being reconstructed by Calumet & Hecla. The mill originaly consisted of 11 stamp units and treated ore from the Conglomerate mine. As reconstructed it will contain nine stamp units and will be equipped to treat both conglomerate or amygdaloid. The mill has been shut down since 1939, and for that reason all the wooden floors and foundations are being renewed and the roof is being repaired. The stamps, railroad trestle, and rock bins are in good condition, but the concentrating machinery will be remodeled. In the conglomerate units it is proposed to use Hardinge mills in closed-circuit grinding. The resulting product will be pumped to the leaching plant classifying system for treatment in the leaching and flotation plants. This is to avoid installing machinery in the Calumet mill itself for this purpose. The amygdaloid rock also will be ground in a closed-circuit grinding unit, but the resulting classifier product will be treated in flotation machines to be installed in the Calumet mill.

For regrinding units it is proposed to take from the Tamarack reclamation plant the Hardinge mills, complete with motors, clutch, and herringbone gears and pinions, and reduce the length of the pebble mill cylinder from 72 in. to 31 in. Instead of imported pebbles now used at Tamarack, steel balls will be substituted. The increased weight of the balls over that of the pebbles necessitates shortening the cylinder. It has been decided to try out both Dorr and Akins classifiers. For the present only six of the nine units of the mill will be fully equipped.

▶ Calumet & Hecla needs at least 500 men to attain peak production. Every effort is being made to obtain workers from outside sources. The U. S. Employment Service is cooperating, but it is handicapped somewhat by the "job-freeze" order in essential war industry. Under certain conditions, former residents who wish to return to the district to work in the mines may do so.

▶ Resumption of mining at the Centennial mine is the next step in the expansion program of Calumet & Hecla Consolidated. Preparations are well under way. The work of repairing the surface plant was started on June 1, and complete repairs have been made to the shaft collar, collar house, skip tracks, and pulley stands. Much remains to be done to the engine house, rock dump, and poor-rock trestle. A contract has been let for construction of a modern cement block changehouse. The old compressor will be replaced with two new electric compressors, which will be housed in a new addition to the engine house.

▶ All of the known copper lodes in the Michigan district were found through outcrops. If the vein in the new Iroquois shaft of Calumet & Hecla or the conglomerate and amygdaloid beds in the new Allouez No. 3 shaft turn out successfully, they will be the first commercial copper bearing formations to be discovered by diamond drilling. Diamond drilling has been an important method of exploration in the Michigan copper district for over 60 years. Calumet & Hecla employs contractors for all surface drilling, but for short underground holes the company uses its own equipment and crews. For some time three surface drills have been kept in operation, three shifts per day, each drill making about 1,400 ft. per month. In recent years, holes to 1,000 ft. in depth have been drilled for around $2 per foot on large contracts. Only occasionally does C. & H. drill deeper than 2,000 ft.

▶ The conglomerate tailing deposits at both the Lake Linden and Tamarack plants of Calumet & Hecla will be exhausted early in the coming year. Whether or not the amygdaloid sands will be worked will depend largely on the price of copper. The two plants have recovered a total to date of approximately 470,000,000 lb. of copper. Average yield per ton of tailings treated has been about 11 lb. of metal.

▶ The Michigan Conservation Commission has been directed by Attorney General Herbert J. Rushton to begin suit against the Copper District Power Co., a subsidiary of the Copper Range company, to halt diversion of water from two Upper Michigan beauty spots, Bond and Agate falls. The commission has been in controversy with the power company for more than seven years over its right to divert water for power purposes. It has complained that a succession of attorneys general has refused to permit litigation over the matter. Chairman Harry H. Whiteley said the suit would involve the commission's right to enter into a compromise with the power company, and not whether the amount of water remaining in the middle branch of the Ontonagon River, in which the falls are situated, is sufficient.

ALASKA

Red Mountain Region Producing Chromite

Placer tin recovered in Ruby district—Army's appropriation of mining equipment causes hardship — Hirst-Chichagof mine closes

▶ Leo Saarela, of the Alaska Department of Mines, reports that the first chrome ore has been received at Kachemak Bay, to be stockpiled for Metals Reserve Co. it comes from the Chrome Queen mine, in the Red Mountain district, on lower Cook Inlet. The ore is being mined by three hardrock miners from Fairbanks. Chrome deposits in the Red Mountain district have been known for many years. B. D. Stewart, of the Territorial Department of Mines, pays cash for chrome ore consigned to Metals Reserve Co. as rapidly as it is graded. It is hauled by trucks from the mine eight miles to the beach. Other chrome mines are being developed in this district.

▶ Mr. and Mrs. Dennis Coyle, of Fairbanks, went into the Ruby district recently and brought out a quantity of placer tin secured in their gold operations. They have turned it over to the purchasing depot of Metals Reserve Co.

▶ At a meeting, in Fairbanks, of the Alaska Miners' Association, Roy B. Earling, general manager of the U. S. Smelting Co., said he believed that the duty of every mining operator is to keep his property in condition so that work may start as soon as the war ends. This he said will insure employment both to those in the armed forces and those engaged in defense work. Plans were discussed for keeping the industry active and replacing equipment, most of which has been taken for defense agencies. E. H. Stroecker, banker, suggested a plan whereby businessmen of Fairbanks would raise a fund to finance prospectors in search for lode properties after the war. W. L. Lhamon, of Northern Commercial Co. deplored the shortage of heavy dirt-moving equipment. Dean E. N. Patty said he would appoint a committee to investigate the proposed plan for raising a prospecting fund. Ralph Weyer, manager of Cleary Mines; Andrew Olson, of Goodnews Bay Mining Co.; Glen Carrington, chairman of the Alaska committee of the Seattle Chamber of Commerce, and many others, were present.

▶ Ganes Creek Dredging Co. has the only camp in operation in the Ophir district. Permission was given some other camps to operate, but the U. S. Army took so much equipment from the mines there was not enough left to do any satisfactory mining.

▶ Mrs. Emma M. Wilson, U. S. Commissioner at Aniak, reports that quicksilver mining and some antimony production are increasing on the Kuskokwim. About 20 men are employed at the Red Devil quicksilver claim at Sleitmut, and Harvey Winchell, H. C. Landru, and Russ Schaeffer have a quicksilver property on Holitna River which they are having investigated. Mining in the district is said to be more active than a year ago.

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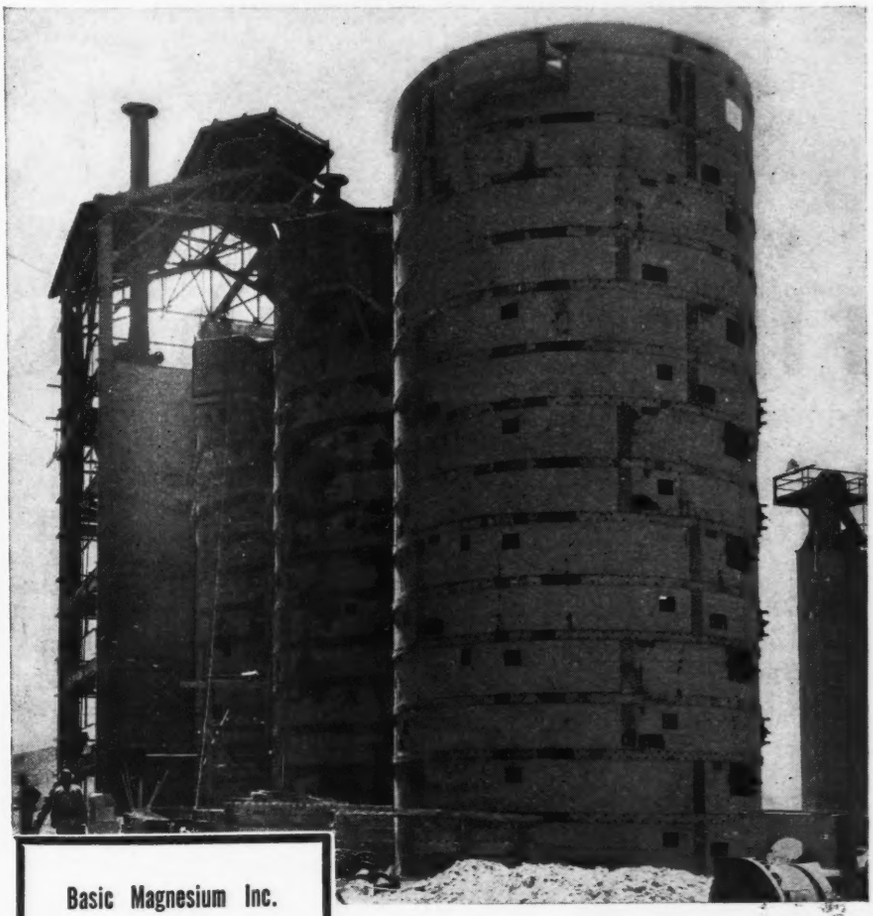

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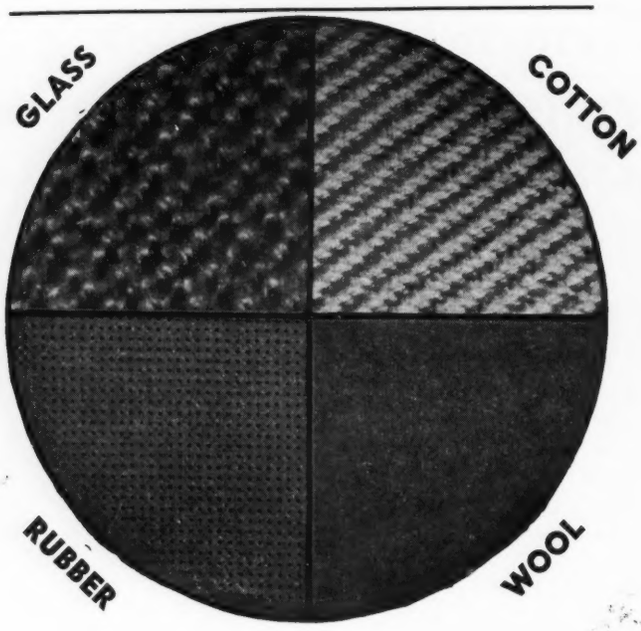

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CHICAGO SALT LAKE CITY

▶ALASKA

▶ The U. S. Bureau of Mines has been drilling the Salt Chuck mine, on Prince of Wales Island. Lee Howard has been operating this property for eight years. It shows values in palladium as well as in gold and copper. The Rush Brown copper mine, in the same locality, also belongs to Howard. Prior to drilling the Salt Chuck mine, the Bureau had been drilling the Poorman iron prospect near Kasaan.

▶ George Fader, U. S. deputy marshal, has sold for judgment creditors the Wendell Dawson mining property near Hollis. Ten dollars was paid for the personal and $1,000 for the real property. The judgment was given Mr. and Mrs. George Mathison on a labor lien.

▶ Molybdenum claims belonging to San Antonio, on Baker Island, have been diamond drilled, with two crews employed.

▶ Hirst-Chichagof gold quartz mine, on Chichagof Island, closed its operations about Sept. 1, leaving a watchman in charge. It ceased work at the instance of the WPB, and will remain closed indefinitely, but will be kept in readiness to be pumped out when war regulations permit. Paul M. Sorenson, manager, says he will enter Army service and M. E. Tippets, superintendent, has gone to California. This rather remarkable mine is mostly below sea level, and has been operated to a depth of 1,900 ft. below the sea. The mine formerly employed 70 to 80 men, but its recent crew was reduced to about a dozen. This mine and the adjoining Chichagof mine have produced more than $20,000,000 in gold.

IRON COUNTRY

Lake Shipments of Iron Again at Record High

Hull-Rust-Sellers pit loads 120,000 tons in one day—New Mather mine ready to produce ore—Zimmerman mine closes

▶ Another all-time monthly record for iron-ore shipments from the Lake Superior district was made during August, when the previous record of July was bettered by close to 400,000 tons. To ship the season's quota it will be necessary to move 34,300 tons from the first of September to the close of navigation in December. This can be done if weather conditions do not become too severe earlier than usual. Movement of ore has been helped this year by addition of nine of the sixteen new Maritime Commission boats destined for the Lake traffic. As of Aug. 15, 312 boats were engaged in the ore trade.

▶ Hull-Rust-Sellers mine, in Hibbing, operated by Oliver Iron Mining Co., loaded 120,000 tons of ore during a 24-hour period recently. This required loading 245 trains consisting of 2,679 cars. To accomplish this a train went in or out of the pit every three minutes during the day. These trains were loaded by 10 power shovels of 5- to 6-cu.yd. capacity

and were hauled by 23 1,000-hp. diesel locomotives.

▶ Butler Bros., of St. Paul and Cooley, Minn., have recently negotiated a lease for the South Agnew mine, in Hibbing, from the Mesabi Mineral Association. The property was formerly operated by Interstate Iron Co., mining subsidiary of Jones & Laughlin Steel Corp. Reserves are approximately 6,500,000 tons. Butler Bros. have also been conducting some exploration work in the Steep Rock district of Ontario.

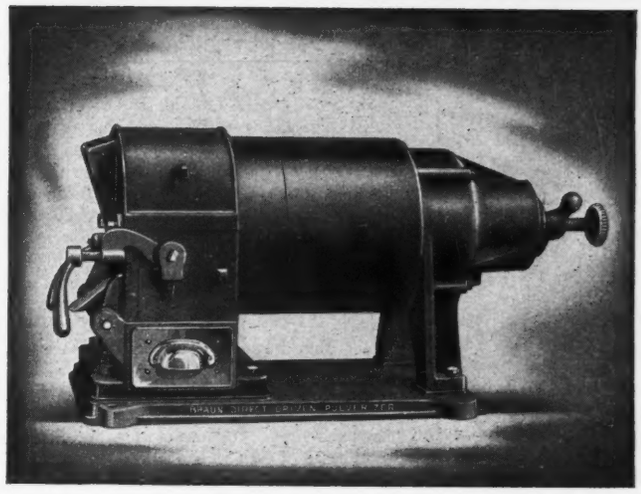
▶ Winston-Morrison-Utah, the contracting firm engaged in stripping the Embarrass mine, at Biwabik, Minn., for Lake Mining Co., has to date removed some 2,150,000 cu.yd. of overburden since April of this year. The water diversion project is progressing rapidly and should help the stripping program considerably.

▶ The Zimmerman mine, at Gastra, near Iron River, Mich., was closed down permanently Sept. 15 after producing nearly 4,000,000 tons of iron ore. It began production in 1910, using steam equipment, under Spring Valley Iron Ore Co., which sold out later to Todd Stambaugh Co. In 1925 the mine was taken over and electrified by M. A. Hanna Co., which operated it intermittently. It covers about 40 acres and has a depth of about 700 ft. It was flooded during the depression but was unwatered in 1941 and has operated steadily since then. Approximately 200,000 tons of ore is still in the mine, but it is too low grade to recover. About 80 men were employed, and they will either be given their release or shifted to other properties of the company in this district.

▶ At the new Mather mine of Cleveland-Cliffs Iron Co., at Ishpeming, Mich., drifting on the 1,600-ft. level has entered the orebody, and the mine should make a substantial production during the remainder of the year. The pump station on the 1,750-ft. level has been completed and pumps are being installed. On the self-propelled top tram cars some additional safety feature details are being built in. The Korfund system of supporting a 16-in. gyratory crusher in a shafthouse 80 ft. from the ground was given a thorough test and found satisfactory, in that no vibration is felt in the shafthouse.

▶ In the Iron River district, M. A. Hanna Co. issued an announcement through G. M. Gannon, assistant manager, that the Saturday night shift at all the company's mines has been discontinued, and that hereafter the men will work an average of five and one half instead of six days a week. The reason is a substantial reduction in the season's tonnage requirements. The mines affected are the Homer, Waseca, Bates, and Hiawatha No. 1 and No. 2. Pickands Mather Co., next largest operators in the district, have announced no reduction and plan to continue the present schedule until the end of 1943. All other operators plan no changes in their present schedules.

▶ On the 35th level of the Montreal mine, at Hurley, Wis., Oglebay Norton Co. has improved the main haulage system, consisting of a double-track line of 40-lb. rail about 3,800 ft. long, by electric welding all the joints solid to full cross-section, thereby forming a continuous



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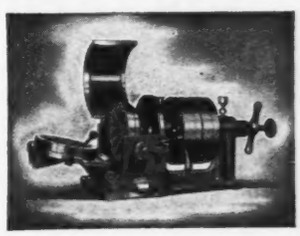

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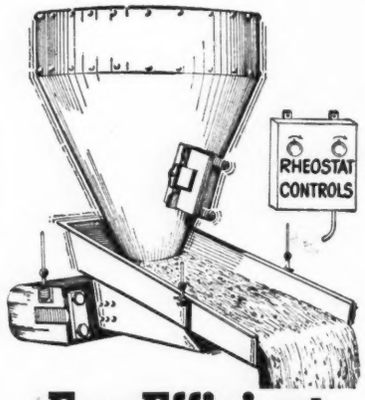

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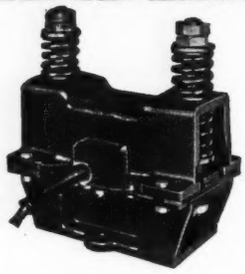

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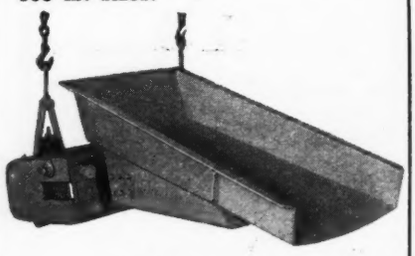

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▶IRON COUNTRY

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CANADA

Labor Shortage Still Mining's Big Problem

Tungsten no longer priority metal—Rockbursts diminish at Lake Shore—Sullivan reports on development work

▶ The wage payroll index of the Canadian Bank of Commerce shows the mining industry to have dropped to 99 in June, compared with 105 a year ago. For the first time since last winter the output of non-metallic mineral products declined from 97 percent in June to a July level of 89 percent of current capacity utilized. During the same period the record of non-ferrous metal production continued unchanged at 154 percent of capacity.

▶ Base-metal mines, ranking among the most essential war industries, may find the present serious labor shortage relieved by men who are being released for civilian occupations by the Canadian home army. The widely quoted announcement that 20,000 of these men are to be discharged shows that men involved are rated unfit for active combat, and it is not known whether health records will show them to qualify as miners. War industries are beginning to make smaller demands on the manpower of the Dominion, and it is believed that before the end of the year a redistribution of labor will be started. Though there continues to be a reduction in the number of men employed by gold mines, it has been announced that Ottawa is appointing a mining man to the Labor Department for the purpose of maintaining an adequate supply of workers. In the Sudbury district a shortage of 1,400 men has developed, largely due to absenteeism. Efforts have been made to enforce National Selective Service regulations through the appointment of a special officer for Sudbury.

▶ Estimates of the use of steel this year in Canada indicate a new record of about 5,000,000 tons of ingots. In the first three years of the war more than half of the total steel required was secured from the U. S., but this year only about a third of total imports will be from that country. The steel companies report serious labor shortages that are threatening to cut output about 15 percent below rated capacity.

▶ As larger stocks of molybdenite, tungsten, and chrome became available in August and September, a trend was indicated for writing contracts for new production at lower rates than formerly. Though the output of both chrome and tungsten is chiefly from properties under government operation, molybdenite production in excess of Canadian requirements is to be secured from the Indian Molybdenum Mine, subsidiary of

WIB Photo

Pouring magnesium in the Ontario, Canada, plant of Dominion Magnesium, Ltd. The operator at left dusts the mold with sulphur so that the molten metal will solidify in a reducing atmosphere.

Dome Exploration and Dome Mines, located near Cadillac, in northwestern Quebec. In the case of mercury, output is well in excess of demand for war material, and its use for other purposes may be authorized.

▶ Some publicity has been given the staking of a group of 54 claims in the Coppermine River area, Northwest Territories, by the American Metal Co. of Canada. This operator has four prospecting parties at work, including two along the Alaskan Highway. Work is in charge of Dr. C. P. Jenney.

QUEBEC

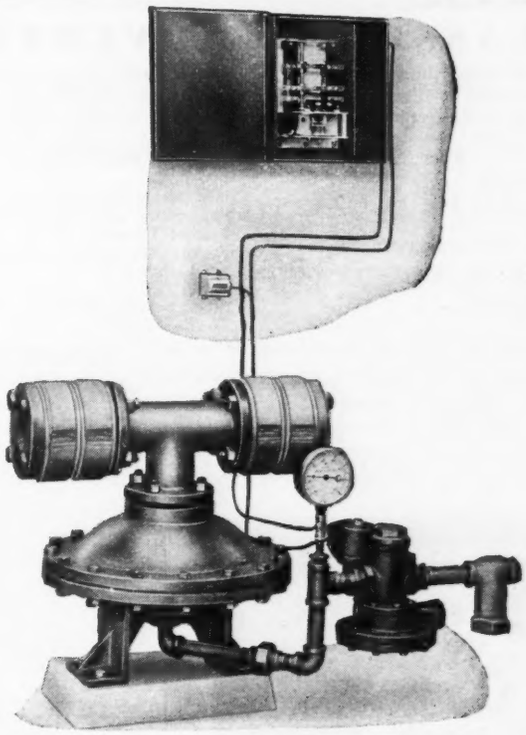
▶ Gold output of Belleterre Quebec Mines reached a total of more than $6,000,000 at the end of the last fiscal year, March 31. President J. P. Bickell, in the annual report, pointed out that the property included the original Mud Lake group of claims that was staked nine years ago in Guillet Township. Discovery and development of high-grade orebodies has been financed by McIntyre Porcupine Mines, which has 95 percent control of Belleterre. A capital investment of about $540,000 has been made in the property and the profits tax has amounted to about $530,000. The report says, further: "Having assumed all hazards peculiar to a venture of this kind, and after nine years of aggressive effort, it will be seen that with high-grade ore, and good equipment utilized to full capacity, we have succeeded in paying so-called profits taxes to an amount approximately equal to the capital invested, and in spite of all this our realized profit presently available to shareholders is, for all practical purposes, 'nil.'"

▶ A majority vote by shareholders of Stadacona Rouyn Mines has decided on maintenance of management under George Duclos, liquidator, until all debts can be paid off. The liquidator will continue to manage the property until it can be turned over to the shareholders free of debt.

▶ Steeloy Mining Corp., having holdings north of Cadillac and within a mile of the property controlled by Dome Mines, is starting a diamond-drilling program under the guidance of a recent magnetometer survey. A molybdenite zone has been indicated for a length of about 450 ft. Alan C. Lee, engineer in charge of the present program, reports promising ore showings.

▶ Income from mines amounting to $2,022,560 is shown in the annual report of the Province of Quebec for the fiscal year ended March 31. Total expenditures for all mining services amounted to $702,594, including road construction and ordinary expenditures.

▶ Exploratory drilling on the 1,250-ft. level of Senator-Rouyn has shown the continuation of ore 150 ft. farther west than any previously known orebody. At this bottom horizon ore has been traced for a length of more than 300 ft., of which the most easterly 20 ft. assayed $8.20. Net profits last year are reported at $251,782, from a total gold output of



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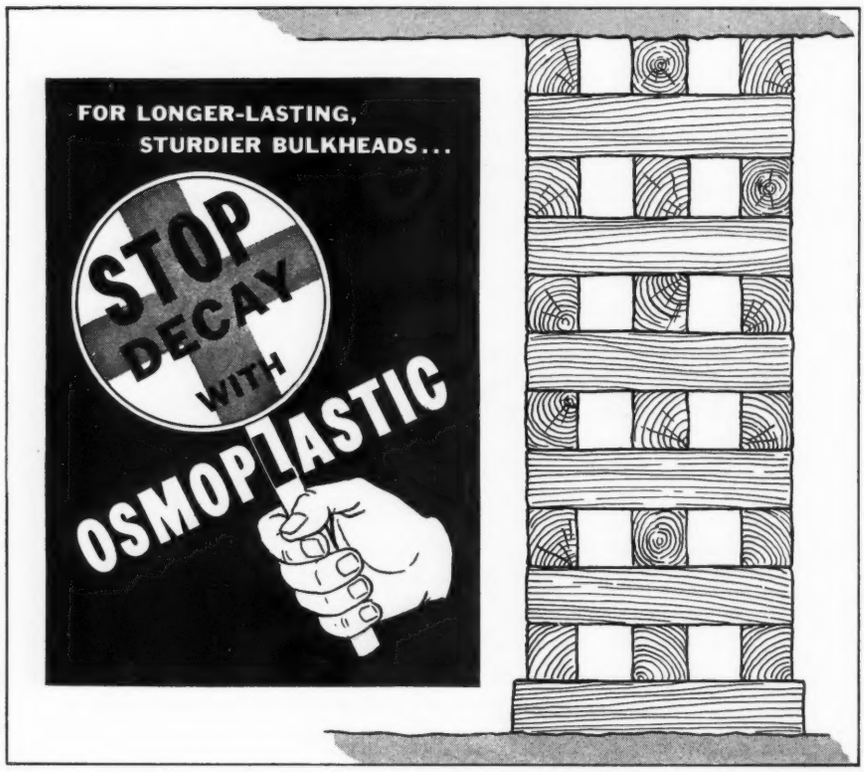

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▶QUEBEC

$909,567 recovered from 105,701 tons. Mine operating costs averaged $4.61 a ton and gold recovery averaged $8.59. All bank debts and preproduction notes have been paid off and the mine paid its first dividend last February. Redmond Quain has been reelected president, and the board of directors was reduced from eight to five members.

ONTARIO

▶ Development work on the 1,900- and 2,050-ft. levels at Central Patricia Gold Mines has been reduced as a result of the labor shortage. Daily output has declined from 400 to 265 tons. A higher grade of ore is being milled in an effort to counteract part of the effect of reduced tonnage, with the result that grade has averaged $14.35 a ton for the first half of this year's output of 60,016 tons valued at $860,667. This compares with the grade of $12.98 a ton for the first six months of 1942. Ore reserves above the 2,050 level are reported by the president, Fred M. Connell, at 450,000 tons. Four new deep levels are to be developed and should improve the ore picture. At this stage, about 1,000 ft. of vein structure have been opened in drifts in the new deep section of the mine, where from three to five oreshoots have been opened on each of the new horizons. R. E. Barrett is mine manager.

▶ A. L. Bloomfield, managing director of Lake Shore Mines, stated in the annual report that a further reduction in the daily mill rate may be necessary before the end of the year as a result of the manpower shortage. Rock-bursts have made it necessary to keep development considerably ahead of mining operations, and the reduced number of men available for development has made this problem critical. A return to normal production rates will require adequate development drifting. Dr. E. A. Hodgson, of the Dominion Observatory, has directed the investigation of rock-bursts as registered by seismic apparatus. Progress has been made in predicting the occurrence of bursts and, for unknown reasons, the number and severity of bursts has considerably diminished. Lower development work has continued on levels down to the 6,075-ft. horizon, and the No. 6 shaft has been deepened to 6,098 ft. The ore-pass system has been completed to the loading pocket at 6,075 ft. in the No. 4 shaft, which is being deepened. Average width of ore exposed in the mine was 57 in. at the end of the fiscal year, and the average gold content was 0.575 oz. per ton. Dr. W. P. St. Charles, president, paid tribute to Sir Harry Oakes in the annual report: "During the 20 years in which he acted as president and as the largest stockholder, his relations with the members of this board were intimate. . . . More than any other man he was responsible for the development of one of Canada's greatest mineral areas. . . ."

▶ By the end of October the contract for

all water diversion at Steep Rock Iron Mines is to be completed, according to a progress report issued by the president, D. M. Hogarth. Special pumping equipment is expected to be delivered so that production can be started on schedule sometime next year. Cyrus S. Eaton, chairman of the board, has announced that a program has been drawn up for long-range sales of iron ore from the property. A Canadian company has been formed for this purpose, Premium Iron Ores, with Mr. Eaton in charge. Sales will be largely to U. S. steel mills, but provision has been made for the Canadian iron and steel industry to have first call on Steep Rock production.

▶ Before the end of the year it is planned to have Naybob Gold Mines discharged from bankruptcy and the property acquired by a new company. Funds are being subscribed in Rochester and elsewhere for an offering of debentures in accordance with a plan approved by the courts providing for the sale of Naybob assets for $135,000, the present indebtedness. When work was shut down last January, the mine manager, L. E. Hansen, discussed ore possibilities in detail to the bottom level at 1,275 ft.

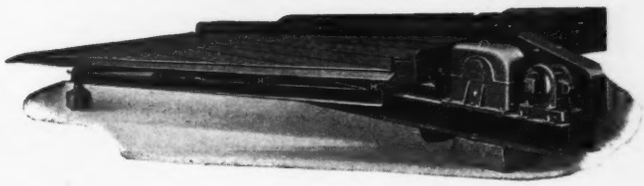
BRITISH COLUMBIA

▶ Announcement this week that priority markets no longer exist for tungsten came as a shock to the local mining industry. The Emerald mine, at Salmo, in the Nelson mining division, which has been developed at great cost by Wartime Metals Corp. because it was considered the largest potential supply of tungsten on the continent, will be closed. The property had not come into production, although it was expected to do so this month. Prospecting for tungsten has been particularly active for the past two years, and some exploration companies had spent much money and time in the search. It is only recently that Bayonne Consolidated Mines, Ltd., stopped its investigations at the Blue Eyes group, near the Emerald mine, after an intensive program of development. The Red Rose mine, near Hazelton, in the Omineca mining division, is the only straight tungsten-producing mine in the Province and has a larger output than any other property in the Dominion. It is operated by Consolidated Mining & Smelting Co. of Canada, Ltd. Bralorne Mines, Ltd., produced some tungsten as a byproduct of its gold-mining operations in the Lillooet mining division.

▶ Silbak Premier Mines, Ltd., Portland Canal subsidiary of Premier Gold Mining Co., Ltd., obtained $63,522 for August production recovered from 6,956 tons, averaging 0.23 oz. gold and 4.75 oz. silver per ton. Estimated operating profit before write-offs was $23,140.

▶ Twin "J" Mines, Ltd., has commenced shipment of copper concentrate to the Tacoma smelter from the Tyee mine, on Vancouver Island. Although a zinc concentrate is also recovered, it is at present being stockpiled awaiting instructions from Wartime Metals Corp., Ltd., under whose auspices the operation was undertaken.

WARTIME MINERAL PRODUCTION *calls for* *SuperDuty* TABLES



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▶ Bralorne Mines, Ltd., British Columbia's largest gold producer. will pay its regular dividend of 20c. per share, plus an extra dividend of 10c. per share, on Oct. 15 to shareholders of record Sept. 25. It is hoped to have the Takla mercury mine in production before the end of this year.

▶ Eagle and Eagle Fraction mineral claims in the Lillooet mining division have been sold for cash by J. M. Taylor to Pioneer Gold Mines of B. C., Ltd. They adjoin and penetrate Pioneer's holdings, being situated within 700 ft. of the main shaft. They also adjoin the Eagle No. 1 claim, which was sold eight years ago by Mr. Taylor to Bralorne Mines, Ltd., and from which a large part of Bralorne production has originated. Owing to the scarcity of labor, no immediate development is planned by Pioneer.

▶ Cariboo Gold Quartz Mining Co., Ltd., largest gold producer in the Cariboo district, recorded its lowest monthly production in August, when only 850 oz., valued at $32,725, were recovered from 2,259 tons, averaging 0.38 oz. gold per ton.

▶ August production of Island Mountain Mines Co., Ltd., Cariboo district, an operation of Newmont Mining Corp., was 711 oz. gold, valued at $27,383, from 1,538 tons, averaging 0.46 oz. gold per ton.

▶ G. M. Goodrich and E. H. Kinder, vet-

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▶BRITISH COLUMBIA

eran British Columbia prospectors, have granted an option to Privateer Mine, Ltd., on the Iceland–Spar group, on Adams Lake, 50 miles north of Kamloops. Two large caves have been found in limestone, completely encrusted on the inside with crystals of Iceland spar of good grade. Privateer has installed pumps and is having special saws made for cutting the crystals.

▶As intimated at a recent director's meeting, Hedley Mascot Gold Mines, Ltd., will suspend milling operations at the end of this month to concentrate every available man on underground development.

▶Reco Mountain Base Metals Mines, Ltd., subsidiary of Gold Frontier Mines, Ltd., has commenced production from the Noble Five-Surprise-Deadman groups at Cody, in the Slocan mining division. The mill feed is gradually being stepped up to the 150-ton daily capacity of the mill. It is estimated that 50,000 tons of commercial zinc ore are readily available, with substantial broken reserves now on hand. Disposal of product will be to United States smelters for the account of Metals Reserve Co.

During the year ended Dec. 31, 1942, development work at Sullivan mine, the world's largest silver-lead-zinc producer, included 8,370 ft. of drifting and crosscutting, 14,412 ft. of raising, and 7,988 ft. of diamond drilling. In addition 44,085 ft. of diamond-drill holes were driven for large-scale blasting. Filling operations placed 233,000 cu.yd. of stowing material. This is still below the volume of underground excavating, and every effort is being made to increase the volume of filling gravel and rock. The largest electric shovel in Canada has been purchased for this purpose. The property is operated by Consolidated Mining & Smelting Co. of Canada, Ltd.

▶Shareholders of St. Eugene Extension Mines, Ltd., operator of the largest lead-producing mine in Canada before advent of the Sullivan, have voted to close the company's affairs. All assets have been transferred to St. Eugene Mining Corp., Ltd., a subsidiary of Ventures, Ltd., a company which is active in exploration and development work in the Pacific Northwest.

YUKON TERRITORY

▶Bill Teare and Bill Forbes have brought representatives of mining companies from the United States into the Carmacks district near Dawson to inspect ore deposits of the Mount Free Gold area, where the two prospectors have been mining.

▶M. Graddis, representing American Metal Co., and John R. Fraser have gone into the Sixtymile district on a tour of inspection.

▶John Packie reports that he and his partners, John Lundeen and Carl Erickson, have been quite successful in their gold-mining operation this season on No. 12 Below Canyon, on Quartz Creek,

in the Klondike. He says the camp was very quiet, with only one other man, John Struger, placer mining.

▶ Don and Herold Boutillier, who were mining this season on Bonanza Creek, have been forced to suspend operations because of water shortage.

MEXICO

First Time in Months, No Strikes in Mines

Railroad equipment lack grows serious—Mining industry approves hygiene resolutions—Committee to control silverware export

▶ Fall found mining in Mexico continuing its upward swing with fewer difficulties. Labor has apparently backed in an all-out manner the presidential plea for cooperation in war materials production. In his annual message to the nation at the opening of the new congress Sept. 1, President Manuel Avila Camacho, while rather generalizing regarding happenings in the mining field during the year ended Aug. 31, said:

"Our mining industry has prospered ostensibly, with regard to both the patriotic attitude assumed by the workers and their employers, and the intensification of production of materials that are necessary for the war effort of the United Nations, for it is certain that the American market will absorb at favorable prices all our exportable supplies in this field."

▶ Currently, there is no threat of a strike anywhere in the industry, and many mines are now on a 24-hour, seven-day-a-week working schedule. Miners seem to be satisfied with pay hikes of 10 to 15 percent, generally, that were granted recently. Some companies have provided cash liberally to enable their employees to establish consumers cooperative societies.

▶ The industry is much interested in the intimation made by Eduardo Suarez, Finance Minister, that the 1944 federal expense budget will be "slightly more than 900 million pesos ($192,500,000)," the highest that Mexico has ever had, and that federal income next year is counted upon to about match government expenditures. Suarez said nothing about any tax increases. Mining has complained from time to time about high taxes, for the business contributes much to the federal coffers. Though no figures are available, the understanding is that this contribution has been greater since the upswing started in mining exports to the United States.

▶ The industry is also interested in the story published by "Novedades," a leading Mexico City morning daily, quoting a high but unnamed official of the National Railways to the effect that unless the company can obtain more locomotives to haul freight, that vital branch of its business is due to collapse early next year under the load

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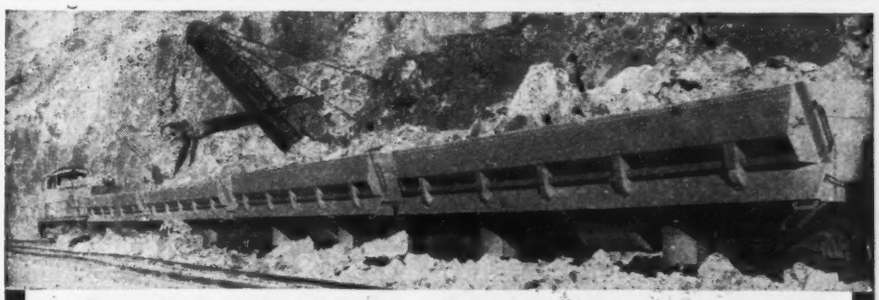

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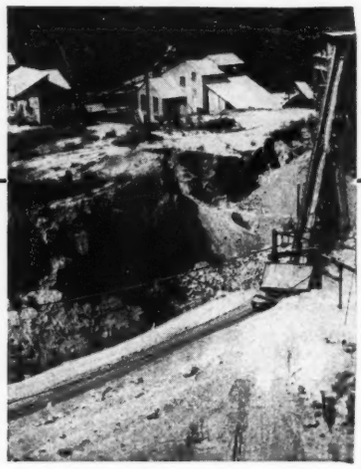

(Explanation of Picture) Conglomerate blasted from the face of a long bank, is gathered by ¾ cu. yd. Sauerman Scraper and hauled to inclined conveyor feeding a processing plant. The scraper unit is operated by one man, consumes about 3½ gal. of gasoline per hour and handles 30 tons of material hourly.

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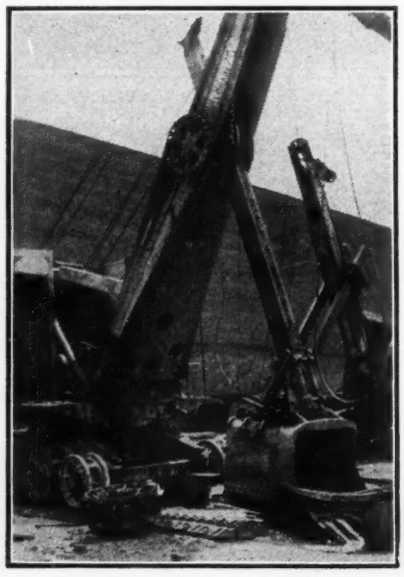

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▶MEXICO

of farm crops of the new harvest. The story said the National now has only 300 locomotives to haul 14,000 freight cars and there is scant hope of getting more engines at present.

▶Emergency meetings to find a solution to fresh economic difficulties are being held by directors of the Dos Carlos mining cooperative society, Mexico's pioneer organization of the kind. The society, organized in July, 1937, by the Cardenas government, took over properties at Pachuca, Hidalgo, of the British-owned Cia. Minera Dos Carlos, S.A., which stopped work when operations became unprofitable. The cooperative has received aid from time to time from state, federal, and municipal governments, the national miners' union, and individual miners. Until recently, its directors had issued good reports of the enterprise's progress.

▶Discovery of an important silver deposit by Jose Garrido, a prospector, at Cerro de la Mina, near Tetela del Volcan, State of Mexico, has been reported to the National Commission for Stimulation of the Mining Industry. As several applications for claims on the tract have been filed, the commission has assigned engineers to examine it.

▶The mining industry was the first to endorse the resolution adopted at the first national convention on labor hygiene and medicine, held recently in Mexico City under auspices of the federal government, that everybody who seeks employment in industries undergo a rigid medical examination to determine fitness. Mining favors this examination as considerably reducing liability for employees who become incapacitated by such diseases as silicosis and tuberculosis, for which the labor law demands the payment of indemnification. Details for the institution of this examination are being worked out with the Labor Ministry by mining and other industrialists.

▶Contribution of 58,000 of the 300,000 pesos ($65,000) cost for the establishment of a prevocational high school to accommodate 1,000 students and be one of the best of the kind in Latin America, at Nueva Rosita, Coahuila, has been made by miners of that place who are members of section No. 14 of the national miners' union.

▶The San Luis Potosi government is being urged by mining interests to resume construction of the road started some time ago to connect Matehuala, important mining center, with the State capital.

▶Debt claims totaling more than 100,000 pesos ($20,650) have been filed against the Cia. Minera Libertad, S.A., backed by American interests, that suspended work some time ago at Mineral de la Campana, Caborca municipality, Altar district, Sonora. The claims have been filed with the Sonora branch of the federal board of conciliation and arbitration. The Banco de Nogales, S.A., an important northwestern bank, with a claim of 62,000 pesos, is the largest creditor. The employees claim 30,000

pesos in unpaid wages and threaten to obtain an embargo of the company's properties unless they are paid in full.

▶ Mines of Hidalgo, particularly those of the Pachuca sector, have a new problem that threatens serious results, a sharp shortage of timber. This shortage is said to result from the recently enacted presidential decree which demands that all lumber mills devote 50 percent of their wood to the railroads to make ties. The decree is intended to correct a shortage of ties the railroads, particularly the government-owned National Railways, are experiencing. Some Hidalgo mining companies have appealed to the federal government for aid. This lumber shortage has not as yet affected mines in other parts of Mexico.

▶ Payment of a dividend of five pesos ($1.05) per share on its last year's profits is being made by the Cia. Minera de San Jose, S.A., A. P. Hermosillo, secretary, at its headquarters offices, Ave. Juarez, No. 40, Mexico City.

▶ Machinery and equipment installations in the central section of the iron and steel works that Altos Hornos de Mexico, S.A., backed by American-Mexican interests, is establishing at Monclova, Coahuila, have been retarded by about six months because of slowness in obtaining priorities in the United States, it is learned. However, such installations in other departments are continuing apace and it is expected they will be completed before Dec. 31. It is hoped that production in most of the plant will start some time in February.

▶ At the request of silversmiths who desire export of their wares to be conducted freely and in conformity with the law, the Ministry of Finance has organized a committee to control exports of silver articles. This committee is seeing to it that all such articles exported are bona fide silverware rather than bullion or silver in other forms disguised as silverware. Eduardo Suarez, Finance Minister, had complained in a press interview about much bullion and other silver being exported as jewelry, a practice which he said was harmful to the Mexican silver and currency situation. He warned that unless this camouflaged silver exporting ceased, the government must take drastic action to stop it, even to the extent of forbidding silver exports altogether.

VENEZUELA

Supply Shortage Hinders Mining Operations

Floods impede diamond production—Three gold producers face cuts in output—Strategic mineral search intensified

▶ Despite strenuous attempts made by the government and leaders of the mining industry here, no improvement can be reported in the restriction imposed by the U. S. Government on export of supplies and equipment to Venezuelan gold mines. It is recognized that the

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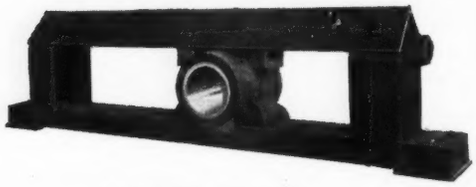

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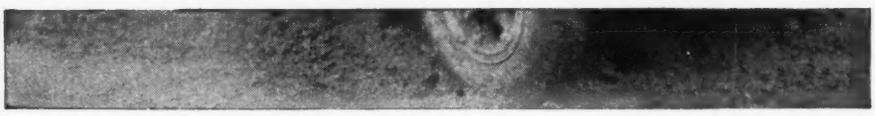

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▶VENEZUELA

adamant attitude of Washington officials is not due to lack of sympathy with or knowledge of the problems of the mining industry of Venezuela, but to a realization of the serious domestic repercussions that would result from even the partial lifting of the ban on priorities for gold mines.

However, enough chemicals and explosives have been obtained to enable the mines to continue operating, albeit on a reduced scale. The remaining difficulties are shortages of drill steel, rock-drill spares, and rubber hose. New Goldfields of Venezuela has installed its own foundry and manufactures a number of small castings, machine parts, and balls for the ball mills.

▶Another calamity has befallen the mining regions. This is the torrential rain that has fallen over the greater part of the country and caused serious floods, with resultant damage to roads, houses, and the cattle industry. At Ciudad Bolivar, the capital of the State of Bolivar, the Orinoco River destroyed more than 400 houses and 8,000 persons were rendered homeless. Floods throughout the Orinoco basin have been the worst in living memory and have caused such widespread damage that the government has had to make a special allocation of funds for relief of distress and for repair of the damage to roads, levees, and aqueducts. Transport difficulties have been increased and trucks, which in the dry season make the trip from Ciudad Bolivar to El Callao in seven hours, are now taking seven to ten days.

GOLD—The chief producer, New Goldfields of Venezuela, Ltd., has further reduced its staff since September last and is milling about 8,000 tons a month. On this basis it may be possible to continue operating at least another 12 months, by which time it is hoped the European phase of the war will be over and some improvement in the shipping position may be expected. El Peru unit supplies about 60 percent of the total ore milled, mainly because the grade of its ore is higher than that of El Caratal unit, and also because it is located closer to the mill.

▶La Compania Francesa de la Mocupia continues to produce about 2,000 tons a month, but costs are higher and the grade is lower than in the past year. A serious blasting accident a few months ago cost the company a large sum in compensation, which will considerably reduce the operating profit for the current financial year. This company previously held a good safety record, and there had been no fatal accidents for approximately seven years prior to the above.

▶At the Vuelven Caras mine monthly production has fluctuated considerably, but the output of gold in the first five months of this year was 64,400 gr., compared with 64,612 gr. in the last five months of 1942, although the tonnage treated was about 43 percent less. In July some foreign engineers, after an exhaustive report on the property, made certain recommendations for the future

development of the mine and the treatment of accumulated tailings sands and slimes.

▶ Production of alluvial gold mine operators has been seriously affected by the unusually heavy rains extending from September 1942 to the present month.

▶ Returns from all gold producers for the first six months of the current year indicate that the total output for 1943 will probably not exceed 70 percent of that reported in 1942.

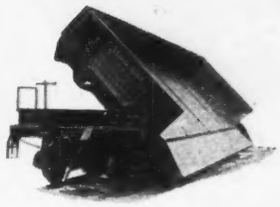
▶ **DIAMONDS**—Since all diamonds recovered are obtained from alluvial workings, it is not surprising that the output reported for the period of January to June (inclusive) indicates a fall of 25 percent compared with the same period in 1942. The drop is due to the recent floods.

▶ **No discoveries of note have been made this season, but La Compania A.M.de Diamantes El Pao has had an American engineer working on a systematic sampling of its concessions. About 20 men have been employed continuously during the past 12 months. On conclusion of this prospecting work, it is intended to operate these concessions with modern mechanical washing equipment. The diamonds found in this field run about six stones per carat, but occasionally large stones are found weighing up to 23 carats. With the use of mechanical equipment this area may return to its previous position of leading producer in Venezuela, although it is not expected to account for 95 percent of the total national output as it did in 1937. Most of the diamonds recovered are of the industrial type and prices paid for them in Venezuela have been higher than the U. S. market price. A considerable development of this industry in Venezuela is expected in the near future as the potentialities of diamond-bearing areas become better known.**

▶ **SODA ASH—The well-known deposit of Urao at Lagunillas, State of Merida, went into production in August, 1942, and the salts are finding a ready market. In December an old chemical plant at Maiquetia was purchased and redesigned to refine and produce caustic soda and sodium carbonate. The Venezuelan glass industry will now be able to obtain all its raw materials from domestic sources.**

▶ **CEMENT**—The government engineers' preliminary report on the Chichiriviche area recommending it as an exceptionally good site for a cement plant has been amply confirmed by sampling done since April. Limestone, clay, and sand are available in immense quantities at a point where the best natural harbor on the north coast is situated. English and American firms are negotiating for an interest in what will be the largest cement plant in the Caribbean area.

▶ **COAL**—During the past six months developments have been reported in the coal industry, due mainly to the almost complete cessation of imports from Great Britain and the U. S. A. Apart from the long-established government mines at Naricual, near Barcelona, on the north coast of Venezuela, the principal new activities have been centered on the coal beds of Sabana Grande del



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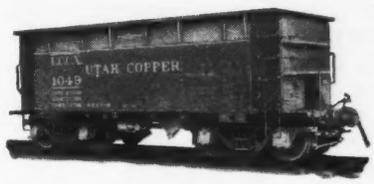

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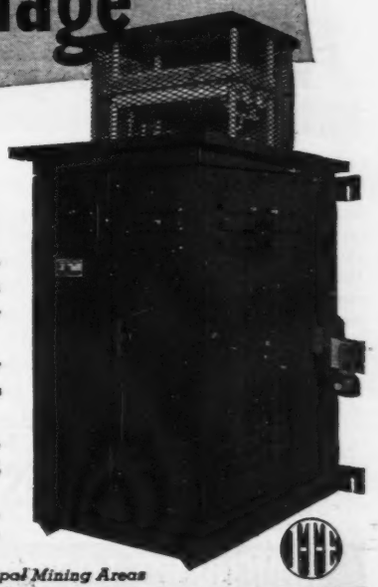

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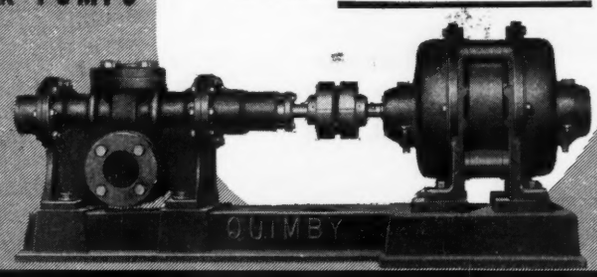

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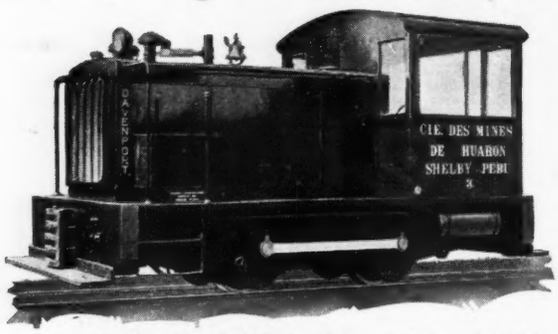

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▶VENEZUELA

Guarico. These concessions have been worked by Don Alfredo de la Sota since 1937, when he formed Cia. de las Hulleras del Guarico, with a capital of $200,000. The property changed hands in recent months and the new owners are attempting to obtain government assistance in making a good truck road to the property.

Hitherto transport of coal from the mines to Caracas has been possible only in the dry season. It is reported that the present capacity of the mine is 100 tons of clean coal daily.

In August another coal deposit was reported near Taguay, in the State of Aragua, and an engineer is at present making a report for a Venezuelan group.

Experiments are being conducted at Naricual with the object of utilizing the large stocks of coal and domestic pitch for the production of briquettes for use in small local industries.

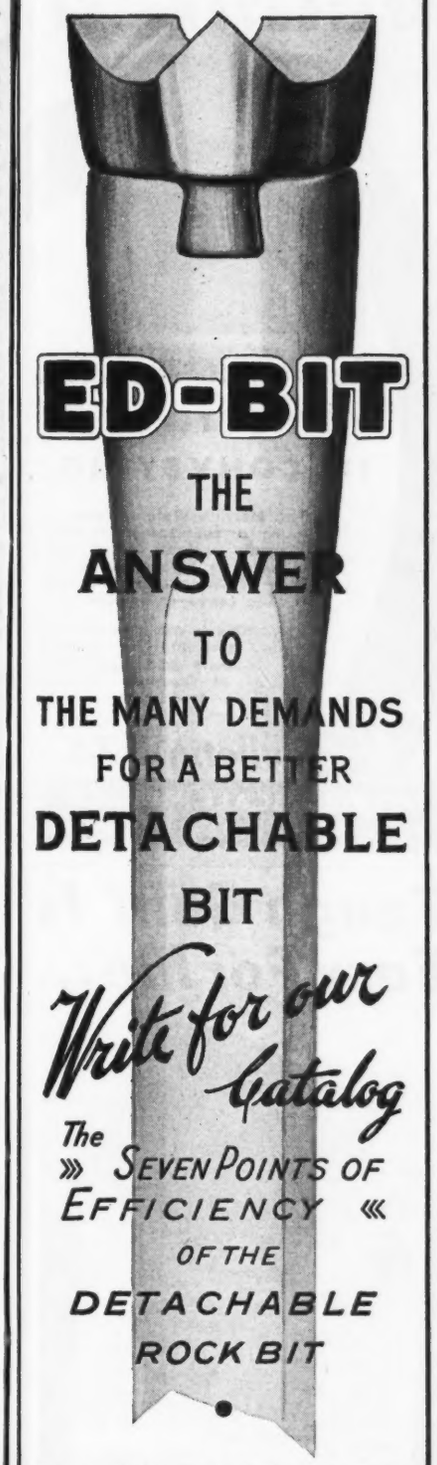
AFRICA

Rand Mines Debate Miner Wage Increase

Diamond demand increases—Rand shows good profit in July—Supply shortage hinders development in most mines

▶The proposed advance in the wages of the natives employed by the gold mines of the Witwatersrand, in South Africa, has created a problem the correct solution of which is considered vital to the future of both the mining industry and the country. According to a carefully prepared statement by the gold producers' committee, a considerable majority of the population of South Africa is dependent, directly and indirectly, for its living on the mining industry. It is feared that if production costs are increased further, an immediate and great decrease of activities and a shortening of the life of the mining industry by many years will be brought about.

It is pointed out that there is an immense tonnage of marginal ore which could be extracted with some profit if costs could be reduced by two to four shillings per ton, and that if costs are only slightly increased this ore will never be mined. If the wage advance is allowed it is expected that three mines, working on very low-grade ore and distributing some £3,300,000 annually, would have to be closed immediately. The general decrease of revenue would result in a reduction of the labor force, in dividends, in the government's income from taxation, and would make it impossible to raise the capital which is required to develop new mines in the areas already proved along the westerly and southwesterly extension of the gold reefs. Maintenance of even approximately the present volume of output is dependent on the development of the new mines and on ability to work the lower-grade ores in the existing mines. It is pointed out that in the past ten years between £80,000,000



and £90,000,000 of new capital has been invested in the gold-mining industry of the Witwatersrand. In the past 32 years the gold mines have paid the State over £24,000,000 in cash. Opinion is that the government will decide against starving the goose which has laid it all those golden eggs and is still laying.

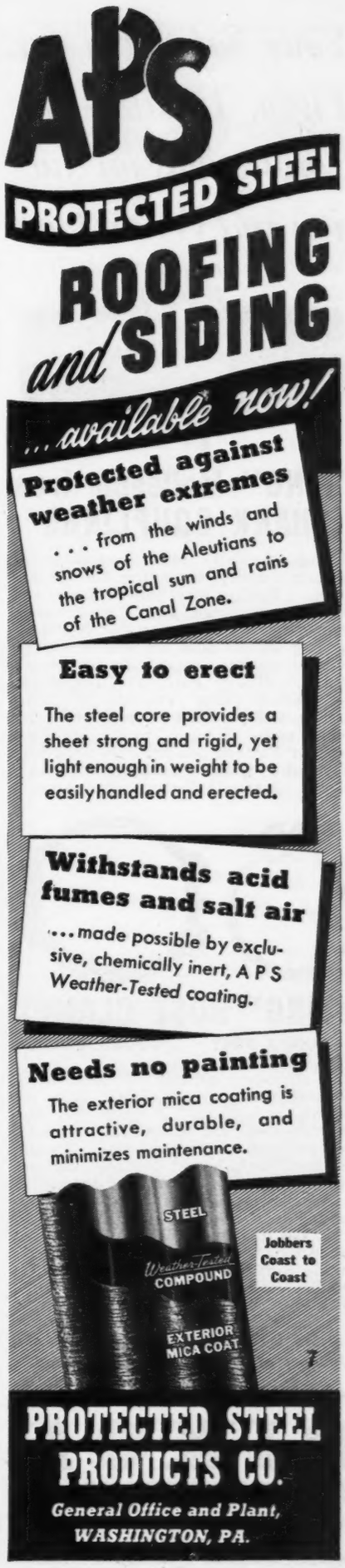
▶ DeBeers Consolidated reopened its Dutoitspan mine on Sept. 1, starting operations with 200 Europeans and 1,000 natives. The mine has been idle for about five years, yet all the machinery is said to be in first-class condition. A second shift will be added later. There is an excellent and growing demand for diamonds. Over £3,000,000 worth of uncut stones were sold at the "sights" held at the end of June. Another was being held at the end of August, and sales were reported heavy. It is reported that a diving bell weighing 80 tons has been constructed to get diamonds out of the bed of the Vaal River. The bell is described as 22 by 12 by 7 ft. in size, large enough for 12 men to work together. There is a conning tower through which the men pass to and from their work. All the diamond producers are now busy and finding an immediate market for their total output of gem and industrial stones.

▶ The combined profit of the Witwatersrand gold mines in July was £3,163,856. This was £9,315 less than in the preceding 30-day month, and compared with July, 1942, is down by £564,724. Preliminary returns indicate a further slight decline in August.

▶ A few of the Witwatersrand mines were able to report slightly increased profits in July. Outstanding among these was Crown Mines, which crushed 14,000 tons more ore and increased its July profit by £16,529 to £231,105. Its working costs were down by 1s. 2d. per ton. Blyvooruitzicht earned £155 more than in July, by treating higher-grade ore, this bringing its profit up to a new high month's record of £12,150. Noarse, East Champ d'Or, Langlaagte, Van Ryn Deep, Rand leases, Rietfontein, and Venters all had just a shade better results in August than in July.

▶ Marievale Consolidated Mines also increased its working profit in August. Last year it treated 597,000 tons of ore, an increase of 5,500 tons; the yield averaged 5.36 dwt., also a slight increase; and working profit came to £450,071, an increase of £22,008. As profit is now being kept above £40,000 per month, it seems likely that there will be a further increase of at least like amount this year. Despite curtailment of development, ore reserves were maintained at 2,500,000 tons and the average grade increased slightly to 6 dwt. per ton taken over a stoping width of 38 in. But its tax bill increased by £106,484, to a total of £232,374, which, it will be noted, absorbed well over half of its total working profit. Marievale was incorporated only eight years ago, in 1935.

▶ Cam & Motor reports for the quarter ending June 30, a working profit of £70,532 from the treatment of 72,600 tons of ore. Development footage driven was 1,170. What may prove to be two very rich areas were being tested. After 443 ft. of diamond drilling, the campaign was discontinued, no values being cut.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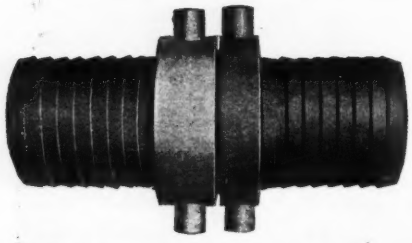

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▶AFRICA

▶ Kentan Gold Areas has issued a preliminary report of the operations of its Geita mine for the year to June 30. Operations were severely restricted by inadequate supplies. Ore milled, 87,375 tons, an average of only 240 tons daily, against 417 tons daily the preceding year, and 21,738 oz. of gold was recovered. Costs averaged 32s. per ton. Ore reserves are estimated as 1,305,896 tons (an increase of 56,463 tons) averaging 4.4 dwt. per ton. The Geita appears to be by far the most important discovery that came out of the extensive exploration of the eastern Africa exploration which occurred a few years ago.

▶ Rhodesia Copper and General Exploration has declared a dividend of 7½ percent. This compares with 5 percent paid a year ago, when payments were resumed after a lapse of four years.

▶ Rhokana Corporation has given notice that it will pay off, on Nov. 30, and retire all of its outstanding £184,450 7 percent debentures. The original issue was £4,500,000, in 1931. The following year £4,225,100 of these were converted into shares, 24 shares being given for each £100. Right to convert expired at the end of 1940. Redemption of the debentures by annual drawings began in 1941. By selling 279,270 shares of its holdings of Mufulira Copper to the Rio Tinto and Rhodesian Anglo American companies and 260,000 shares of Nchanga Consolidated Mines to Anglo American Corporation of South Africa, Rhokana provided itself with the funds to retire its debentures and to finance capital expenditures already made.

AUSTRALIA

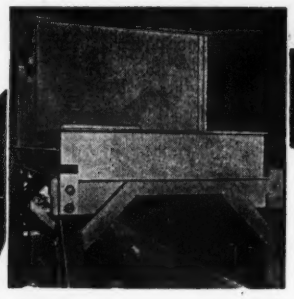
Gold Mining Declines in Western Australia

Paringa Mining Co. discovers new vein—Tax outlook bad for Broken Hill mines—New iron ore body opened by Broken Hill Proprietary

WESTERN AUSTRALIA

▶ Comparative figures for 1941, 1942, and the first five months of the present year clearly show the effect of prevailing conditions upon gold mining in Western Australia. Although the year 1941 had felt the influence of the war, gold mining was then regarded as an essential industry, and it was not until the entry of Japan into the war that a complete reversal of government attitude toward gold mining took place. Although the industry's position is now serious, with many important producers either closed down or reduced to a maintenance basis, the state affairs might be worse if the mining companies had not laid in large stocks of stores and spares some time ago. Admitting the necessity for withdrawal of labor from the industry,

MERRICK WEIGHTOMETER



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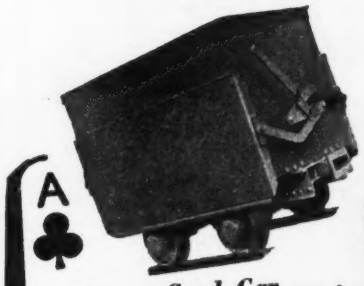

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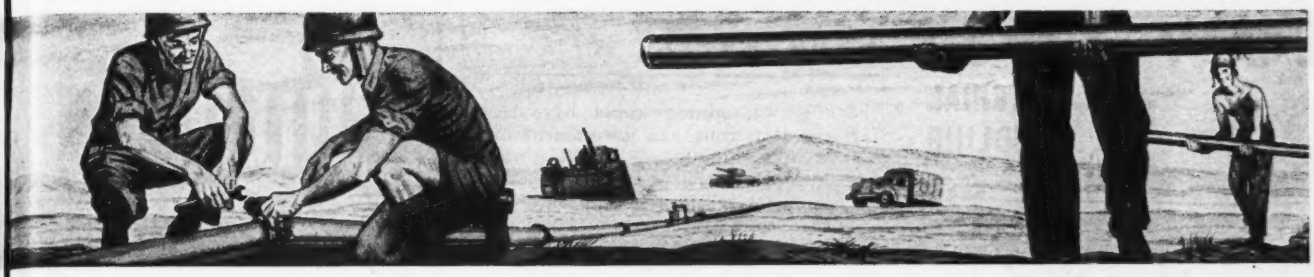

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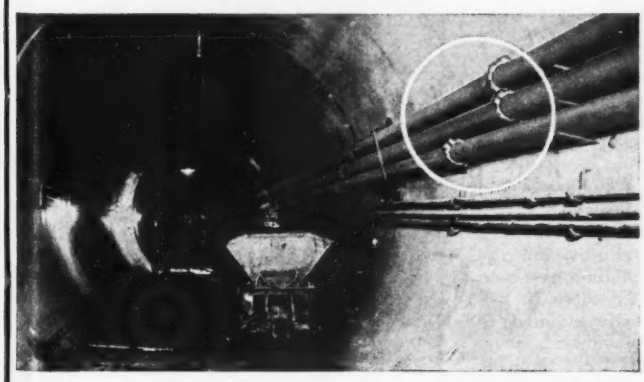

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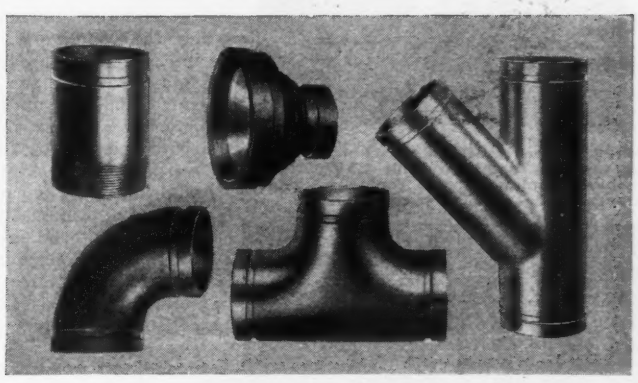

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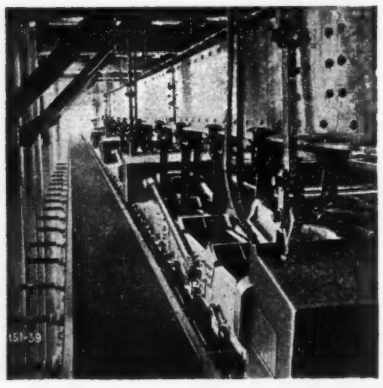
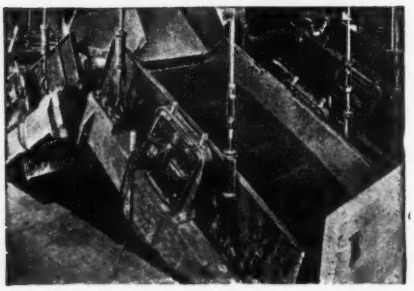
Jeffrey-Traylor grizzly feeder discharging 250 tons per hour to picking belt conveyor. Separation at 3" and fines are by-passed crusher. Also open or totally enclosed pan feeders.



Jeffrey-Traylor reverberatory charging vibrating conveyor equipped with 22 Quick-acting discharge gates—permits rapid charging of furnace. No mechanical wearing parts.



Battery of J-T single deck screens used to by-pass fines in conjunction with crushers and rolls.

Jeffrey-Traylor (patented) units provide low cost handling — positive control over tonnage — use balanced high frequency vibration under absolute control. Send for Catalog No. 650.

The Jeffrey Manufacturing Co.

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▶AUSTRALIA

the effect on mining would have been far less disastrous had government displayed some intelligence in the process and allowed efficiency to be a feature of the labor retained.

Such a course would have minimized the serious depopulation of inland centers which has resulted; and lessened the loss in business and general economic dislocation which has ensued. The seriousness of the position can be realized from the fact that the production of gold is Western Australia's greatest industry. Seven-eighths of its area is low rainfall country and for the most part poor soil with very low pastoral carrying capacity. Only about one-eighth can be regarded as agricultural land. With low population, secondary industries are limited, and the prosperity of the state depends largely on its gold. The following tabulation gives the production figures in the present, and two past years.

Western Australia Gold Production, Fine Oz.

	1941	1942	1943
January	89,899	70,088	52,952
February ...	78,266	66,275	47,189
March	80,504	75,101	44,381
April	84,779	78,810	45,834
May	86,492	74,861	43,420
June	79,109	63,634	.....
July	84,680	83,402	.....
August	90,050	61,955	.....
September ..	81,852	61,370	.....
October	118,223	87,336	.....
November ..	82,173	56,275	.....
December ...	87,365	53,397	.....
Total ..	1,043,392	832,504	233,776

▶The property of Paringa Mining & Exploration Co., Ltd., in the Kalgoorlie gold field, lies between the leases of Gold Mines of Kalgoorlie, Ltd., on the east and those of North Kalgurli (1912), Ltd., on the west and south, and is, therefore, on the northern margin of the famous Golden Mile. Operations on the company's leases were resumed in 1934 and in the period to 1937, a total of 6,000 ft. of diamond drilling and 16,030 ft. of underground development established the value of the property, and mining and treatment plants were erected. At that stage the lodes were regarded as carrying moderate gold values, approximating 5.5 dwt. per ton. Since then the mine has established itself as a consistent producer and the area of the company's holding has been steadily increased from 21 acres to 238 acres. Operations are still confined to shallow depths, as the lowest level opened up is only 640 ft. from surface.

In 1942 attention was directed to the mine by the discovery of a shoot of rich ore at the 520-ft. level, and later, its location on the 640-ft. level. The value and importance of the new shoot is indicated by the following notes: On the 520-ft. level the combined lengths of the north and south drives was 281 ft., at the date the information was made available, and the average value was 53.96 dwt. gold ton over an average width of 59 in., which is, apparently, that of the drive, for crosscutting has disclosed greater widths. At 63 ft. above the level, crosscutting showed 27 ft. of ore assaying 6.31 dwt. per ton, and winzing to

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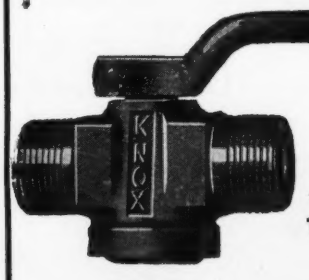

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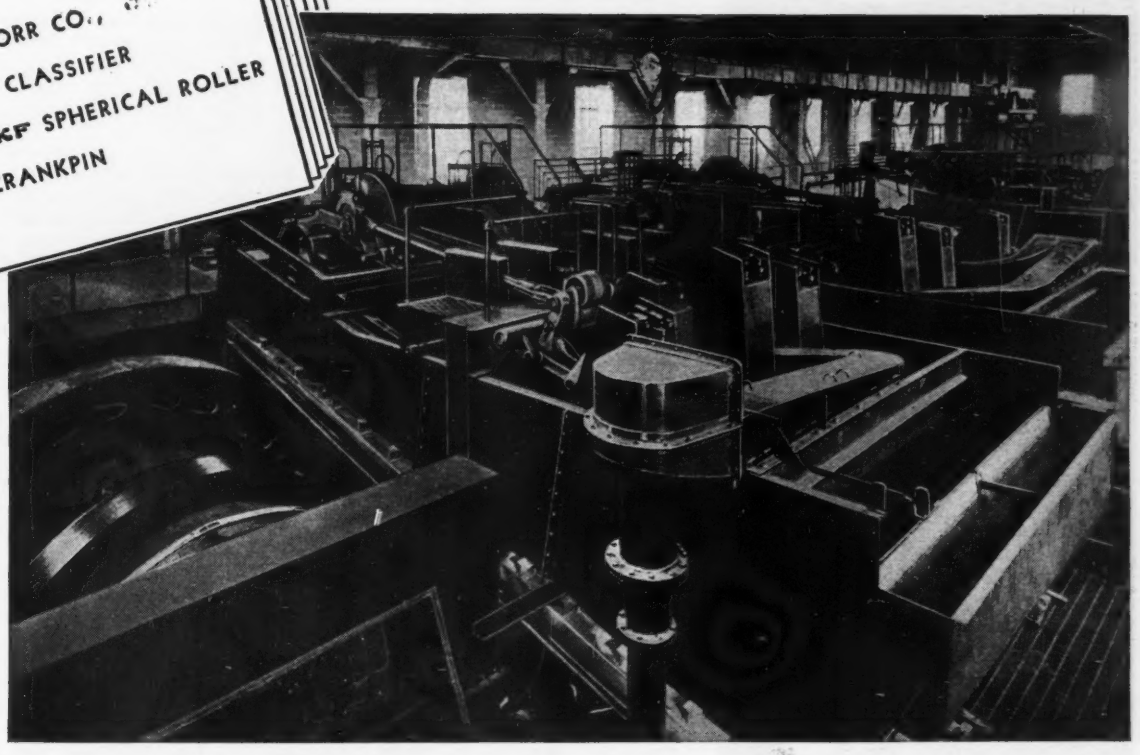

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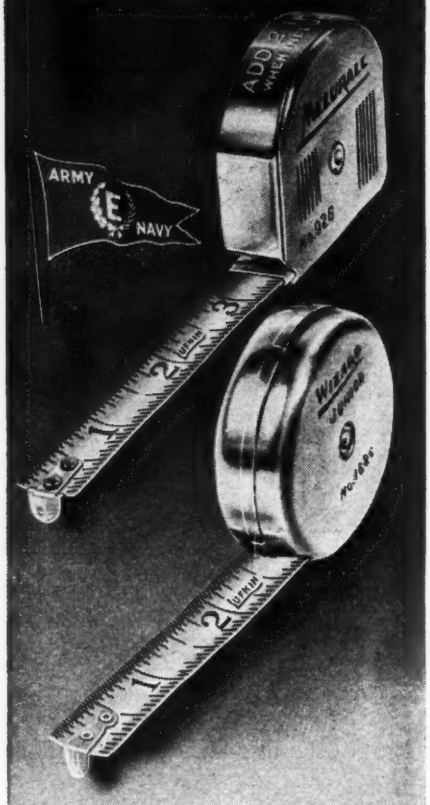

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▶AUSTRALIA

89 ft. below the level gave an average grade of ore of 30.75 dwt. per ton over a mean width of 53 in., and a second winze, then sunk to a depth of 57 ft., gave values of 38.66 dwt. over a width of 48 in. At the same time, work at the 640 ft. level had disclosed a length of 160 ft. of ore carrying an average value of 7.5 dwt. over a width of 60 in. and a winze sunk to a depth of 66 ft. showed ore with an average assay value of 10.83 dwt. over a width of 60 in. The tonnage of ore regarded as proved in the shoot at that date was estimated at 22,841 long tons with an average assay value of 22.96 dwt. per ton, the average width being stated as 8 ft. The full dimensions of the shoot are by no means proved and work is proceeding as fast as deficient labor force will permit.

NEW SOUTH WALES

▶One of the greatest hindrances of the Commonwealth's war effort, according to most mine operators, is unintelligent taxation. The urgency for increased output has always been stressed, but from the beginning of the war, miners feel that taxation has blocked enterprise. Initially, it was found that the operation of the taxation scale was such that tax payable on profit resulting from increased production would result on actual loss on the increased output. This anomaly was rectified only after prolonged discussion. The wasting nature of a mining asset was refused recognition and mines were placed on the same basis as industrial enterprises. An exemption from tax of 8 percent was permitted; later this was threatened with reduction to 4 percent, but was eventually increased to 20 percent in the case of companies producing metals and minerals essential to war purposes. It was further provided that dividends paid to shareholders out of exempted company income would also be free from tax, though this provision was excluded in the first place.

A list of 26 metals and minerals to which these conditions apply has been issued, and it now appears that lead and zinc are not among the metals to which exemption applies. Prior to the issue of the schedule it was naturally inferred that lead and zinc, being important munition metals, would share in the taxation provision.

The situation which has arisen will have a serious effect upon the profit and taxation outlook of the Broken Hill mining companies, and in their case the government does not recognize the provision of a depletion allowance such as has been permitted to mining companies producing the specified 26 metals. Discussions are proceeding between the companies and the government, but the fact that there has been no immediate admission of error is regarded by many as an instance of ignorance and lack of sincerity on the part of the government.

▶An ore occurrence with a checkered career is that which has recently been opened up by the Broken Hill Proprietary Co., at Cadia, for the production of iron ore. The history of the deposit began in 1862 with the discovery of copper, and copper mining continued intermittently until 1917. The copper lode underlay a mass of hematite, some 80 ft. in thickness, dipping east at an angle of 35 deg., both footwall and hanging walls being andesite.

The iron occurrence was originally estimated to contain 36,000,000 tons of ore and was taken up in 1918 by the Hoskins Iron & Steel Co., which transported the ore to the blast furnaces at Lithgow, 103 miles distant. Cadia was one of the sources of supply of this company until the smelting works were transferred to Port Kembla, on the coast, south of Sydney. Upon the merging of Australian Iron & Steel, Ltd., successors to the Hoskins Co., with Broken Hill Proprietary Co., iron ore was drawn from the mines at Iron Knob, South Australia. Cadia, as well as other smaller iron ore occurrences in New South Wales, was abandoned.

Arising from increased war requirements and the need to reduce transportation as much as possible, the Broken Hill Proprietary Co. examined the iron resources of this State, and the Iron Duke deposit at Cadia was reopened. Two years prior to this event, however, gold had been discovered in the hematite at the northern end of the deposit, and a mill was erected for its recovery by amalgamation and cyanidation. It was thought at that time that gold might be distributed throughout the occurrence, but it was ultimately found to be confined to a narrow zone of cross-fracturing. Cadia is 254 miles from Port Kembla and 293 miles from Newcastle, the present centers of iron and steel production in the State.

The ore is siliceous and averages 51 percent iron with 0.11 percent manganese. Sulphur and phosphorus are low. It is quarried on two benches and lowered by gravity in skips of 4-ton capacity to the loading bins at the railway siding in the valley at the foot of the deposit. Average grade of the haulage incline is 1 in 4. Ore is loaded at the quarry face by power shovel, the maximum size of the broken material being 18 in.

▶Lake George Mines Ltd., at Captain's Flat, Southwest of Goulburn, earned a small profit, the first in the history of the company, in the last financial year. The mines were first opened in 1882, the original workings being for gold and later for copper. Work ceased early in the present century, and the mines were idle until late 1929.

An extensive exploratory campaign by underground development and diamond drilling established an important lode extending for more than 3,000 ft., with width varying from 20 ft. to 40 ft. The orebody is nearly vertical in dip and the country rock is of Silurian age, consisting of slates and breccias. The lode is a replacement body and contains galena, zinc blende, chalcopyrite, and pyrite, with small quantities of good and silver. The gangue is quartzose and aluminous, and the ore is fine grained. Lead content approximates 8 percent, zinc 12 percent, copper

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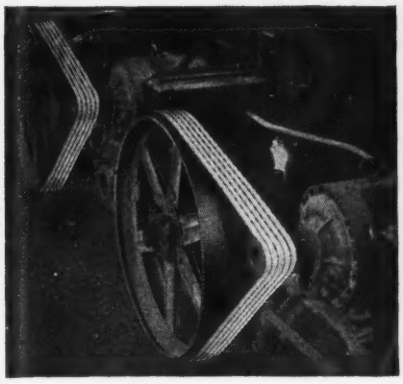

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In any case, the wisest move you can make is to phone the Gates Field Engineer. He is thoroughly competent to analyze any drive problem. He is completely informed on on the nature and advantages of every type of belt. He will always recommend the practice that will be most efficient and economical for you.

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Rutile from Zircon
Steel grindings from abrasive grain
Silicon carbide from aluminous abrasive
Biotite mica from muscovite mica
Pyrite from scheelite
Graphite from mica

The above list is by no means complete for separations possible with the Electro-Float Separator.

• • • • • •

WHAT DOES AN ELECTRO-FLOAT UNIT COST?

One SINGLE ROLL UNIT (6″x 48″) complete with feeder, motor, two cutting knives, ready to be attached to your electrostatic rectifier and having a capacity of between 1,000 and 4,000 lbs. per hour, costs $1750.00 f.o.b. Dallas, Texas. (Rectifier costs between $400.00 and $700.00 depending on size.)

★ ★ ★

We will be glad to tell you more about the Electro-Float separator which is now in active use in many large plants.

We can arrange to run samples for you of granular particles which are finer than 8 mesh and coarser than 150 mesh.

SUTTON, STEELE & STEELE, INC.
DALLAS, TEXAS
SALES AGENTS
SEPARATIONS ENGRG. CORP.
110 E. 42nd STREET
NEW YORK, N. Y.
S&S
THE PROCESS FOR BETTER PRODUCTS—FASTER

▶AUSTRALIA

slightly below 1 percent, silver less than 2 dwt., and gold under 1 dwt. per ton.

Concentration is by flotation, and the nature of the ore calls for close control of fine grinding to effect a satisfactory separation. The ore is high in pyrite, which forms a large part of the primary concentrate. A market for this product is a matter of importance to the company, and as a new outlet is reported to have been found, enabling about one-half the production to be sold, it appears to have a material effect upon operating profits. In the past year milling operations were in excess of the original rated capacity of the mill, but were 77 percent of its present potential capacity.

VICTORIA

▶ The only dredging operations in the State are those of Victoria Gold Dredging Co., N. L., on the flats bordering the Loddon River, at Newstead. The company has been successful since its inception. The original computation of payable material on the leases was 15,000,000 cu. yd. with an average value of 3.64 gr. per cubic yard, and a mean depth of 24.5 ft. Additional ground has since been obtained which provided a further 3,000,000 cu. yd. of dredgeable ground.

The dredge has a capacity of 175,000 cu. yd. per month, has buckets of 9½-cu. ft. capacity, and is electrically driven. Owing to the labor position, the plant is at present working only one shift a day. In the period of two weeks to June 15, the dredge operated for 209 hours and dug 88,704 cu. yd. for the recovery of bullion estimated to contain 415 oz. of gold, or a recovered grade of 2.2 gr. per cubic yard. In the following fortnight, to June 29, operating time was 234 hours, in which the plant treated 83,261 cu. yd. of ground for a return of bullion estimated to contain 503 oz. of gold, equivalent to 2.9 gr. per cubic yard. The ground is easily worked and costs are low under normal operating conditions.

Government Issues New Explanatory Publication

DESIGNED TO AID business men and government officials in obtaining information on all products, materials, and service handled by the WPB, a new publication called *Products and Priorities* will be issued by WPB every four weeks. All information formerly included in *Priorities* and *Product Assignments* will appear in the new document, and the former publications will be discontinued. An alphabetical index of everything coming under WPB control will be included, as will numbers of WPB forms, CMP references, responsible WPB divisions, and lists of claimant agencies. A year's subscription to *Products and Priorities* costs $2, and can be obtained from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C.

ROSS FEEDER
Completely Controls

the flow of any size material from Storage Bins, Hoppers or Open-Dump Chutes to Crushers, Conveyors, Screens, etc.

High in efficiency. Low in maintenance and power consumption.

Furnished in sizes to suit your operation. Scalping unit to fit your chute if desired. Send full particulars for recommendation.

ROSS SCREEN & FEEDER CO.
19 Rector Street, New York, U. S. A.
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Canadian Licensee: E. Long Ltd., Orillia, Ont.

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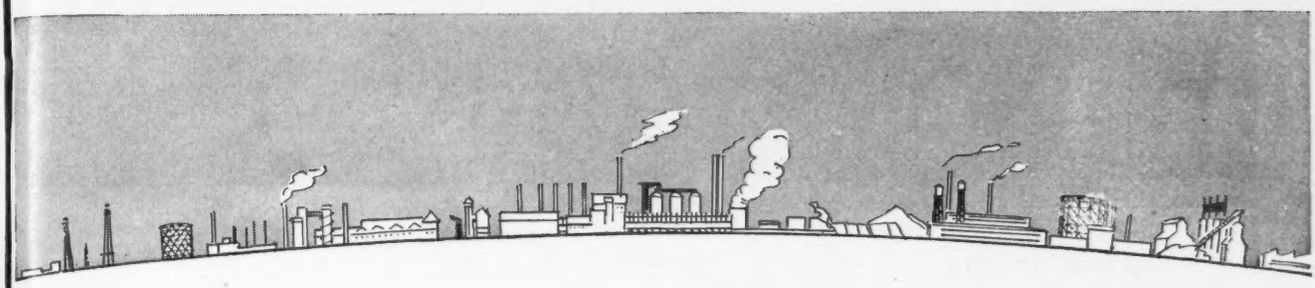
IT'S EFFICIENT—Poidometer Operate at Maximum Efficiency and Accuracy when in Top Condition

IT'S PATRIOTIC—Well Conditioned Poidometers do a Better Job—Last Longer, Require Fewer Repairs—thus Release Vital Materials for other War Machines

WRITE FOR CATALOG #7

SCHAFFER POIDOMETER CO.
2828 Smallman St. PITTSBURGH, PA.



LISTENING IN ON INDUSTRIAL AMERICA

WITH "ears" as big as those of a listening post at the battle front we are catching sounds of a stirring, restlessly active industry—the sounds of plan making for the world stimulating changes of the coming post war era.

New processes, new materials and new equipment are already being developed and perfected to provide for a far higher standard of living. Many of these will be out-growths of developments born of war's necessities in which specialized refractories by Carborundum have played such an important part.

Take synthetic rubber for example. In certain processes "Carbofrax," with its high refractoriness, low spalling tendency and high thermal conductivity has helped to make higher production possible.

The unusual properties of "Carbofrax" are likewise utilized to excellent advantage in the manufacture of some of the materials required in synthetic rubber products to give them the desired characteristics.

In one method by which magnesium is produced, the highly corrosion resistant refractory "Monofrax" plays a vital role. Another magnesium process requires the use of "Carbofrax" because of its high strength at elevated temperatures and rapid heat conductivity.

In the production of zinc and molybdenum the unique properties of "Carbofrax" are again of tremendous importance in increasing output—reducing operating costs.

Thus, it is by no means surprising that we have our ears tuned to the plans for tomorrow—listening for word of new processes in which the use of Carborundum Brand Super-Refractories will undoubtedly prove of great value.

If your process—either present or planned—presents a refractory problem, we would welcome an opportunity of discussing it with you.

CARBORUNDUM

THE CARBORUNDUM COMPANY • PERTH AMBOY, N. J.

REG. U. S. PAT. OFF.

Refractory Division

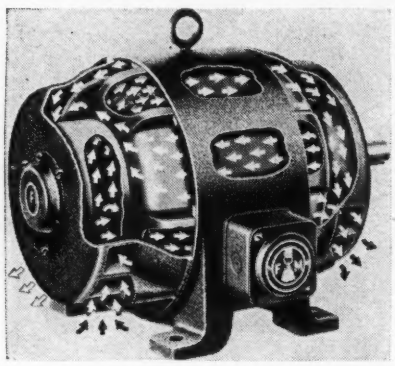
District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh. Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Company, El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

(Carborundum, Carbofrax and Monofrax are registered trade-marks of and indicate manufacture by The Carborundum Company)

Equipment News

Protected Steel Sheeting

USEFUL for essential maintenance and repairs, a new protected steel roofing and siding has been made available through regular jobbers' channels by Protected Steel Products Co., Washington, Pa. This new sheet provides a protective coating that is said to withstand successfully extremes of climatic conditions and to be acid-resistant as well. An extra coating of mica is applied to the exterior of the sheet to enhance its appearance and avoid the necessity for painting after erection.



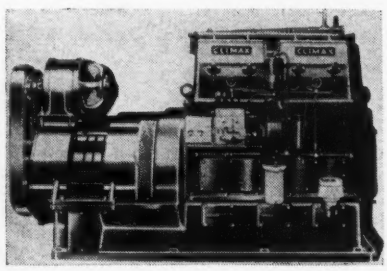
The new fully protected polyphase squirrel-cage induction motor developed by Fairbanks-Morse & Co., Chicago, Ill. Complete information on this new motor is contained in the company's bulletin, No. 1160

New Tough Alloy Steel

EIMCO CORP., Salt Lake City, Utah, has announced the development of a new alloy steel said to be superior in wearing qualities to the company's supermolychrome steels formerly used in the mining industry. The new product, called Utaloy, is said to possess particularly good qualities of resistance to impact and abrasion, and is suggested for use in ball-mill liners, jaw crusher plates, elevator buckets, feeder plates, bin liners, and other items subjected to severe wear and shock.

New Detachable Bits

A NEW IDEA in detachable rock bits and a new method of assembly have been developed by American Mining & Research Co., of Upper Darby, Pa. Known as the Ed-Bit, Series 300, the new bit employs a dovetail means of attachment, and is used in conjunction with an adapter made to fit the most popular drill rod threads now in use. This combination of the new type bit and the shock-resisting alloy steel adapter is said to reduce transportation of steel to the working face to a minimum and to prolong the life of drill rod threads.



The new four-cylinder, solid injection, compression ignition engine recently announced by Climax Engineering Co., Clinton, Iowa. Said to offer many operating advantages, this unit supplies 44 hp., or 30 kva., from a generator. a two-cylinder, 22-hp. unit is also available

INDUSTRIAL NOTES

Army-Navy "E" awards for excellence in the production of war materials, or renewals of original awards, were recently given to: **Macwhyte Wire Rope Co.**, Kenosha, Wis.; **Handy & Harman**, Bridgeport, Conn.; the **Los Angeles, Calif.**, mills of **Phelps Dodge Copper Products Corp.**; and **Jenkins Brothers**, Bridgeport, Conn.

Clayton S. Shoemaker has been appointed Eastern sales manager in charge of the expanded activities of **Dow Chemical Co.** in the Eastern area. His headquarters will be in New York. **Ralph E. Dorland** continues in charge of the New York office.

Paul Dietz has been appointed export sales manager for the general machinery division of **Allis-Chalmers Mfg. Co.**

Walter J. Glenn, sales manager of **American Mining & Research Co.**, Upper Darby, Pa., announces that **Sam A. Madrid** has been appointed Western factory representative with headquarters at 320 Market St., San Francisco, Calif.

W. H. Bachman, of **C. S. Card Iron Works**, Denver, Colo., recently became president and general manager of the company.

E. Perry Holder, president of **Vulcan Iron Works**, Wilkes-Barre, Pa., has been elected president of **Wickwire-Spencer Steel Co.**, succeeding **E. C. Bowers**, who resigned recently because of ill health.

Hercules Powder Co. announces establishment of a sales research division to investigate new markets for its chemical products under the direction of **Dr. John H. Long.**

Charles A. Petri has been appointed advertising manager of **Falk Corp.**, Milwaukee, Wis.

Bill Roberts, sales engineer with **Western Machinery Co.**, San Francisco, Calif., has been assigned to the **Wemco New York** office, which is in charge of **Herman Daniels.**

John N. Cronk resigned on Oct. 1 as advertising manager for **Denver Equipment Co.** to join the advertising department of **Commercial Solvents Co.** He will be succeeded by **Walter L. Schump**, formerly with **Mine & Smelter Supply Co., Denver**, Colo.

BULLETINS

Industrial Screens. Wedge-Bar Screen Corp., New York, N. Y., offers an 8-page bulletin on non-blinding profile bar screens in special assemblies for all industrial screening purposes.

Pipe Threaders. Operating and maintenance manuals for portable and stationary pipe threading machines are available from Oster Mfg. Co., Cleveland, Ohio. All users of this equipment should obtain them.

Reconditioned Machinery. Morse Bros. Machinery Co., Denver, Colo., has released a new edition of its catalog of reconditioned mining and milling machinery. Considering present shortages of equipment, a surprisingly complete selection is offered.

Coal Storage. Coal Specialties Co., New York, N. Y., has prepared a bulletin describing approved methods of storing coal and protecting it during storage with CO_2 fire extinguishing devices.

Liquid Level Control. An electronic device for controlling level of liquids in tanks is described in a 4-page bulletin of Photoswitch, Inc., Cambridge, Mass.

Motor Maintenance. Ideal Commutator Dresser Co., Sycamore, Ill., offers a new 88-page booklet on maintenance of electric motors and generators. The information presented is designed to keep equipment running at peak efficiency.

Apron Feeders. In a 24-page bulletin just published by American Manganese Steel Division of American Brake Shoe Co., Chicago Heights, Ill., Corey C. Brayton, inventor of the Brayton-Amsco apron feeder, gives the history of the device and describes several noteworthy installations of it.

Insulating Materials. The entire line of G. E. insulating materials is described in a new 60-page catalog released by General Electric Co.'s Editorial Service, Bridgeport, Conn.

Turbine Pumps. The Pomona Pump Division of Joshua Hendy Iron Works, Pomona, Calif., has prepared an excellent description of its Westco turbine pumps in the form of a 60-page catalog, which includes operating and installation data, and a discussion of various applications of the pump.

Heavy-Media Separation. The application of heavy-media separation processes to concentration of fine sizes of ore is discussed in No. 12 of the series of ore-dressing notes published by American Cyanamid Co., New York, N. Y. The possibility of treating material as fine as 100 mesh is presented.